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THE DIVISION IN ATTACK.

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Not to be taken into the Front Line Trenches.

(ISSUED BY THE GENERAL STAFF.)

(Revised Edition.)

Issued down to:

Battalions,
Batteries,
Squadrons.

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INTRODUCTION.

Victory can only be won as the result of offensive action.

The success of an offensive campaign depends upon the degree to which the attacking troops possess:—

- (i.) The will to go forward.
- (ii.) The skill to go forward.

These two military qualities reinforce each other, but the one cannot replace the other; both are necessary, and both can be developed. Upon their development all training for battle must be based.

The inculcation of the will to go forward depends upon a close study of the characteristics of the troops. Leaders must understand their men, so as to be able to develop in them those qualities of temperament or race which have made the different sections of our nation such formidable fighters in the past, and which make them so still. All troops do not respond to the same impulses; but all troops respond to some impulse, and the secret of successful leading lies in the discovery and cultivation in each body of men of the particular quality or motive which engenders and keeps alive in them the will to conquer. If this spirit of determination is to reach its full development, there must be sympathy and comradeship between officers and men. An officer who knows his men, who cares for their well-being and comfort before his own, who plays as well as works with them, and who is their friend as well as their commander, will be followed wherever he may lead.

This is the true meaning of moral; it lies at the root of all achievement and endurance in war by the soldiers of a free state. There will be little further reference to it in this pamphlet; but it is of vital importance, and must be assiduously watched by commanders of all grades, and nursed both by example and by precept.

The statement that victory can only be won as the result of offensive action is at first sight a platitude. It is necessary to analyse its real meaning. Offensive action implies pressure, the exertion of continuous force. In stationary warfare, the pressure must be exerted. The enemy must be made to realize that he is always liable to attack; that any success against him will be exploited to the full; and that if he breaks away, he will be followed and given no rest. Even in times of temporary retreat, the pressure must be maintained. The enemy must be met with a dogged resistance and must feel against him the determination which refuses to be beaten. The pressure, therefore, is moral as well as physical.

Thus offensive action in the wider sense includes that which may be described as truculent endurance—the power to resist to the uttermost because the offensive spirit is always alive.

It is obvious that such an offensive spirit—always present, frequently breaking into offensive action, and, when it does so, invariably going “all-out” in the process—would soon exhaust any troops unless it were combined with skilful handling. The two qualities—eagerness to fight and the knowledge of how to fight—must, therefore, be developed simultaneously.

There has been a tendency during the present war to look upon trench warfare and open warfare as two separate things. This has led to a disregard of many of the fundamental principles, laid down in the training

manuals issued before this war, as being inapplicable to trench warfare. Most noticeable have been the neglect of the principle of distribution in depth both in attack and defence, the loss of individual initiative, and the exaggeration of the value of ground for its own sake. There are also other examples. We have now, however, resumed our allegiance to the principles of training employed before this war, and must be careful not to depart from them again. Trench warfare, stripped of the trimmings and side-shows in which it has been wrapped by the development of scientific appliances, stands revealed as open warfare temporarily brought to a standstill, and its general conduct is governed by the same principles as those which govern open warfare. Trench warfare is, really, only a phase or variation of open warfare, not something essentially different from it; and troops trained to fight in the open can adapt themselves easily to the more cramped and intense conditions of trench fighting, while the reverse is not the case.

These are the broad principles which must govern the training and employment of divisions.

PART I.

PRELIMINARY MEASURES.

CHAPTER 1.—TRAINING.

The successful conduct of a battle depends upon the rapidity with which local successes are gained and exploited. As the advance proceeds and the enemy's organized defences are overcome, the actual direction, and to a large extent the control, of the operations must necessarily devolve upon the commanders on the spot. It is absolutely essential, therefore, that commanders of all grades should be able quickly to grasp the salient features of a tactical situation and to act with boldness and decision. Training must aim at the production of commanders and leaders. It is vain to hope for success unless commanders possess power of leadership based upon knowledge and an ability to appreciate a situation. Initiative must not be cramped by too rigid orders and methods of instruction. The training of the troops must be designed and carried out with a view to the development of initiative and to the encouragement of the moral of all ranks.

(i) *Infantry*.—The initiative, self-confidence and offensive power of the infantry must be developed to the utmost. Marching must be practised continually. Troops must be thoroughly trained in the tactics of open warfare, including night operations of all kinds, in order to exploit to the full any success which they may attain.

Movement to the positions of assembly, forming up for an attack especially under cover of darkness, maintenance of direction during the attack, fire and movement, defence against low-flying aeroplanes, use of ground, rapidity in manoeuvre, protection of flanks, employment of formations to suit the ground, rapid reconnaissance, the communication of information to the rear and to the flanks, and the passing of orders must all be practised. Attention must also be paid to the training of advanced guards and the movement of troops across country when not actually in contact with the enemy.

Infantry must be practised in co-operation with the artillery, trench mortars, tanks, machine guns, and contact patrol aeroplanes, which will accompany them in the attack. The necessity for keeping close up to the creeping barrage must be impressed upon all ranks. Troops must be trained, moreover, not to depend unduly upon the artillery barrage.

Lewis gunners must be trained to push well forward with the leading riflemen. They should form the framework of the infantry advance, and every effort must be made to teach them how to use ground and to take advantage of cover.

The importance of training their men in patrol work must be impressed upon all commanders. Scouts and observers should receive special instruction in map reading and in the use of the compass.

Infantry transport must be practised in crossing difficult ground; as, in the event of a rapid advance, it will be necessary for it to move forward with as little delay as possible.

During training, troops should wear the equipment they will carry during active operations, or equivalent weights.

(ii.) *Artillery*.—It will usually be necessary to reinforce the artillery on the front of attack, and the majority of the batteries must be sited well forward in order to support the advance of the infantry to the greatest possible distance without excessive movement during the early stages of the attack. The concentration of a large mass of artillery in a short time without attracting the attention of the enemy requires a high standard of training in the occupation and concealment of positions, particularly from aircraft, and in the methods by which accurate fire may be opened with little or no previous registration.

The success of artillery in open warfare will largely depend upon its ability to move forward rapidly and to come into action unobserved. In training the artillery, therefore, especial attention should be devoted to reconnaissance, mobility and use of ground. Liaison between the artillery and infantry and R.A.F. must be practised. Arrangements with regard to the supply of ammunition in the advance must also be carefully tested during training.

(iii.) *Machine Guns*.—Machine gunners must be trained to co-operate with the infantry and the artillery in every phase of the attack. Much will depend upon the initiative and quick decision of machine gun commanders, the mobility of their guns, and the power of their gunners to avail themselves of cover.

During training constant attention must be given to the following points:—

- (a) Co-operation with the artillery in the barrage arrangements.
- (b) Rapid selection of positions.
- (c) Use of ground when moving forward to new positions.
- (d) Rapid occupation of positions.
- (e) Selection of targets and rapid opening of fire.
- (f) Rapid organization of the machine gun defence in depth when a pause occurs in the advance.
- (g) Ammunition supply.
- (h) Communications.
- (i) Use of wheeled and pack transport.

(iv.) *Trench Mortars*.—Light and medium trench mortar units will accompany or follow the infantry in the attack, in order to bring fire to bear upon centres of resistance which may check the advance. Training, therefore, should include practice in co-operation with infantry and machine guns, in the selection of positions and of observation posts, and in the rapid construction of emplacements.

The forward movement of trench mortar units must also be continually practised. This includes the reconnaissance of routes, the use of ground and the supply of ammunition.

(v.) *Tanks*.—Tank units, in addition to assisting the advance of the infantry across the enemy's organized system of defences, will be called upon in open warfare rapidly to exploit any success which has been obtained by disorganizing the enemy's reserves and breaking up his communications. Tank units must be trained to co-operate with the other arms in the attack, and also to act on their own initiative whenever an opportunity offers for developing a success.

(vi.) *Cavalry*.—In the event of a successful penetration of the enemy's defences on a broad front by the infantry and tanks, the cavalry and horse artillery must be ready immediately to seize any opportunity which may arise

in order to exploit the success and to cover the farther advance of the infantry. The cavalry should be trained to take up positions of readiness and to move rapidly over broken ground. It must make every use of its mobility and fire power. Commanders must realize the necessity for prompt and rapid action, and the importance of fire effect from a flank. Patrols must be constantly practised in maintaining touch with the enemy's rearguards.

The greatest attention must be paid in training to reconnaissance, the use of ground, the writing of messages and reports, and communication generally.

(vii.) *R.A.F.*.—At all stages in the battle the R.A.F. will be called upon to co-operate with the other arms. If the advance is to be successful, the most careful combined training is necessary, especially between the R.A.F. and the infantry and tanks. Great attention must be given to the system of communication. Pilots and observers who are to take part in any operation should be informed of the general plan of attack and of the probable action of the enemy. They should be thoroughly acquainted with the country over which the advance is to take place, and of the enemy's centres of activity and routes of approach. Reconnaissance previous to the attack should, however, be carried out with due care so as not to excite the enemy's suspicion.

(viii.) *Signal Communications*.—During training, all means of communication should be employed and all ranks should be practised in their use by night as well as by day. The system of communications which will be required during the attack must be worked out and tested beforehand. The frequent movement of headquarters and report centres should be practised. It is essential that the meaning and use of all visual and flare signals, including those of units on the flanks, should be absolutely clear. Their allotment and the method of their employment should not be altered subsequent to the training previous to an attack.

(ix.) *Engineers and Pioneers*.—The successful exploitation of an attack will largely depend upon the speed and skill with which communications (roads, heavy and light bridges, tracks, tramways, light railways) are repaired or constructed. The value of good communications pushed rapidly forward cannot be over-estimated; the movement of reserves, the advance of the artillery, the supply of ammunition for the guns, trench mortars and machine guns, the getting forward of ammunition, supplies of food and water, engineer stores, etc., to the infantry, as well as reliefs and the evacuation of the wounded, are largely dependent upon the rapidity with which communications are restored and new tracks and routes constructed.

Engineers and pioneers should be especially trained to carry out with rapidity the following tasks:—

- (a) Engineer reconnaissance.
- (b) Construction of tracks for infantry, pack transport, etc.
- (c) Repair and construction of roads and bridges and the removal of obstacles.
- (d) Organization of working parties.
- (e) Superintendence and assistance of the infantry in the construction of supporting points and the consolidation of villages and woods.
- (f) Opening up of existing sources of water supply.

(x.) *Medical Services*.—Arrangements for the evacuation of the wounded from regimental aid posts should be tested during training. The shifting of aid posts and advanced dressing stations should be carefully practised. Field ambulance bearers should be trained as far as possible to make use of cover, because, if the advance is rapid, they will have to work in the open. They should also be practised in working by night on unfamiliar ground.

CHAPTER 2.—PLAN OF ATTACK.

Section 1.—General Principles. (F.S.R. Part I, Section 103).

The offensive battle consists of a series of attacks delivered on a wide front, but not necessarily on a continuous front. In parts of the line where the enemy's outpost zone is organized in considerable depth in front of his main battle position, it may be necessary, as a preliminary measure, to carry out a minor operation, or a series of minor operations, in order to capture and to occupy suitable ground from which to initiate attacks on his main defensive system. Such minor operations will usually consist of a series of local attacks directed against positions of tactical importance in the enemy's outpost zone, the capture of which will facilitate an attack on his main defences. To conceal the actual front where an attack is eventually to be delivered, it will be necessary to carry out similar minor operations on other parts of the line.

The employment of tanks in these minor operations is usually both unnecessary and uneconomical. The proper function of tanks is not the reduction of the enemy's outpost line of defence, but the penetration and destruction, by means of a surprise attack, of his main battle position. Should it be found necessary, therefore, to use tanks to overcome any particularly stubborn centre of resistance in the outpost zone, they should be withdrawn into reserve and under cover as soon as possible after they have achieved their purpose.

As soon as the preliminary operations have been completed and the necessary preparations made, the main attacks will be delivered. As a general rule, these attacks should be pushed to the fullest extent possible. This does not imply that where an attack has completely failed, a fresh attack should be immediately launched with other troops. On the contrary, in such circumstances, the attack should generally not be renewed until the defence has been shaken by further bombardment, by the infantry fire fight, by the bringing up of additional means of assistance to the infantry (e.g., tanks), or by an enveloping movement. If, however, an attack meets with initial successes, these must be exploited at once by the bold and rapid intervention of all available troops.

Section 2.—Disposition of forces.

The disposition of troops along the front of attack will be determined primarily by the two following factors:—

(a) The necessity for the concentration of force against those portions of the front where decisive results are aimed at; and

(b) The necessity for disposing adequate strength behind the flank or flanks of the above portions of the front, so as to provide means for the formation of defensive flanks, if required, or for meeting counter-attack.

The most careful arrangements must be made before an attack is launched for the protection of the flanks, so far as circumstances permit. Such protection is best secured by the distribution in depth of the attacking force. This enables the rapid and timely intervention of the supports and reserves on the threatened flank or flanks. Such intervention should not be passive; it should consist of a bold and vigorous offensive directed against the hostile force which threatens the safety of the flank or flanks.

Every commander is at all times responsible for the immediate protection of his flanks. At the same time, in order to develop a success it will often be necessary, especially in the earlier stages of an attack when it is of the utmost importance to take every advantage of the enemy's disorganization, for a unit to push forward when the advance of the unit on its flank has been brought to a standstill. The attack must be pressed relentlessly at points where

the enemy's resistance is weak. Reserves should be employed where progress is being made and not in places where the attack has been checked. A commander should not hesitate, therefore, to continue his advance merely because he is uncertain as to the situation on his flank. The flanks of the leading units must be protected by the action of the units in rear. This should be practicable so long as the attacking force is distributed in depth.

It is the duty of commanders to economize their forces as much as possible and to arrange for the engagement of the reserves at the right time. Premature engagement of reserves should be avoided as it invariably exhausts the momentum of the attack and may bring the offensive to an end before the defeat of the enemy has been effected. Every commander, however, must have his reserves well in hand and far enough forward to enable him to utilize them promptly and effectively to exploit a success, to drive back a hostile counter-attack, to protect exposed flanks, or to make good heavy casualties. Arrangements must be made, therefore, to form battalion, brigade and divisional reserves.

The sectors of attack must be carefully allotted to the various units and the objectives clearly defined. Except in a regular trench to trench attack, however, units should not be so rigidly bound within the limits of their sectors as to fetter their power of manoeuvre.

Section 3.—Depth of attack and choice of objectives.

The objectives allotted to formations and units must not be too strictly limited, and all commanders should be allowed latitude in the execution of their tasks.

The maintenance of communications, the endurance of the attacking troops, the strength and moral of the enemy's forces and the organization of his defensive system must all be taken into consideration in determining the depth of the objectives. In the fighting for the enemy's outpost zone and in the earlier stages of the main attack through the enemy's organized defences, the division will be given definite objectives, the distance of which from the starting point of the attack will depend upon the conditions to which reference is made above. If the degree of resistance encountered is less than was anticipated, or if for any other reason the attacking troops after reaching their objectives are still capable of further action, commanders should push forward in order to exploit their successes to the utmost limit. When the enemy's main line of resistance has been broken and his forces in these positions have been defeated, it is essential that the advance should be continued with rapidity and that every advantage should be taken of the enemy's disorganization. It will not then be possible or advisable to fix the objectives with the same precision. Formations will be directed on localities of strategic or tactical importance often at a considerable distance in advance.

Each unit in the leading line of the attack must have its objective definitely assigned to it, e.g., the capture of a particular strong point or tactical locality, and positions which are to be passed by and subsequently captured by means of envelopment should be clearly indicated.

Units which follow should be given sufficient latitude in action to admit of their employment to assist in carrying on the advance of the leading units either by means of local outflanking movements, or by direct support, if such support is required. Nothing should be done to hamper the initiative and freedom of manoeuvre of subordinate commanders.

As soon as a limited objective has been gained, or whenever there is a pause in the advance, arrangements must be made:—

- (i.) To resume the offensive at the earliest possible moment.
- (ii.) To guard against counter-attacks.

Units, therefore, must be reorganized and defence organized in depth. Patrols must also be sent forward and reconnaissances made with a view to ascertaining the enemy's dispositions and intentions.

Section 4.—Conditions of Success.

To ensure success it is necessary to have a good plan of attack, and to prosecute it with determination and on correct principles. This implies a high standard of training, discipline and energy on the part of all who have to carry out the attack.

The essential conditions are:—

(a) Good intelligence, which implies accurate information as to the enemy's moral, strength, dispositions, and defensive organization.

(b) Secrecy and care in preparation.

(c) Surprise in delivery.

(d) Rapidity and vigour in execution and exploitation.

(a) The intelligence branch must be able to state the strength and dispositions of the enemy's forces and, in conjunction with artillery staffs, the approximate number and position of guns which the enemy has available on the front which is to be attacked. It must also supply commanders with maps shewing accurately all the information which has been collected from aeroplane photographs, prisoners' statements, ground observation, patrol reports, etc., with regard to the enemy's defensive organization, the position of his supports and reserves, the roads, routes, railways and tramlines which he uses, and the minor tactical features, such as streams, woods, embankments and marshy ground, in the country over which the attack will take place. The greatest care, energy and thoroughness are required, therefore, from the intelligence branches of corps and divisions in the line not only in procuring such information, and in sifting, collating and filing it, but also in handing it over to incoming formations. (For detailed information with regard to the duties of the divisional intelligence branch, see Appendix D).

(b) *Secrecy and care in preparation.*—The most rigorous secrecy must be observed with regard to any projected operations. The preparation and transmission of all plans and orders must be carefully supervised. The reconnaissances should be carried out under the personal responsibility of the divisional commander, who should take every precaution to maintain the absolute secrecy of all preparations. Reconnaissances should be carried out in conjunction with the officers of divisions in the line, but all movements of reconnoitring parties which might attract the attention of the enemy should be avoided. The preliminary training of troops and the arrangements for the supply of material and ammunition must be so devised as not to betray the actual intentions of the higher command. The time and place of an attack should not be communicated to the troops who are to take part in it until the last possible moment.

(c) *Surprise in delivery.*—Surprise is essential to any far-reaching success. The commander of the attacking force has the initiative in making his dispositions, and his object must be to keep the enemy in uncertainty as to (1) the frontage and limits of his intended attack, and (2) the actual day and hour when the attack will be delivered. Every effort should be made, therefore, by the commander of the attacking force to deceive the enemy and to mislead him as to his intentions. On the front where the attack is to be delivered every precaution should be taken to avoid arousing the enemy's suspicions. The preparations for the attack must be made with the greatest caution. The action of the artillery should remain normal, and there should be no unusual activity by patrols or raiding parties. All movement on roads and railways in rear must be carefully

considered and regulated. All forward movements of troops and transport towards the front which is to be attacked should be made by night. Troops must be constantly instructed not to expose themselves unnecessarily to air and ground observation. The strictest discipline must be preserved in billets. There must be no abnormal increase of traffic or of signal communication.

(d) *Rapidity in Execution and Exploitation.*—The importance of a rapid advance must be impressed upon all ranks. Unless every advantage is taken of the surprise effected by the first assault, the enemy will have time to rally and to bring up his reserves. The exploitation of success depends mainly on the prompt initiative of all commanders. It is the duty of every commander as soon as he sees any sign of wavering on the part of the enemy on his front to push forward with the utmost vigour in order that instant advantage may be taken of the enemy's demoralization to complete his defeat and prevent him from reorganizing his defence. Reserves must be pushed forward to support the troops in front, and to relieve from anxiety about their flanks troops who have penetrated the enemy's positions. All arms must co-operate vigorously. The enemy must be given no time in which to recover. The advance must be continued to the limits of endurance.

When the troops are obliged to halt, steps must immediately be taken to protect the force from surprise, outposts must be established, reserves organized and arrangements made for defence in depth against counter-attacks. The force which has been engaged in the attack must be reorganized and preparations made for resuming the advance at the earliest possible moment.

If, at any period in the operations, the enemy succeeds in breaking off the fight, and in withdrawing under cover of rearguards to another defensive position in rear, the advance of the attacking force must be covered by tactical advanced guards, which should be immediately organized, and should operate on the lines laid down in F.S.R., Part I., Chapter 5.

CHAPTER 3.—PREPARATIONS FOR THE ATTACK.

Section 1.—Methods of Deceiving the Enemy.

In order to effect a surprise the enemy must be kept in ignorance of the intentions of the attacking commander up to the last moment. This can be done:—

(a) By making or simulating preparations on fronts other than the part of the line where the attack is to be launched; and

(b) By concealing, as far as possible, the preparations for the actual attack.

In simulating preparations on other fronts, attention should be paid to the following points:—

(i.) Increase in traffic and movement by day and by night.

(ii.) Reconnaissances by commanders and staff officers of divisions other than those in the line.

(iii.) Increase of fires and lights.

(iv.) Construction of new works, e.g., aerodromes, artillery and trench mortar emplacements, ammunition dumps, buried cable lines, hospitals, railways, roads, tracks, etc.

(v.) Registration by artillery on different points from different positions, and increased activity, especially in counter-battery work, against the enemy's more distant batteries.

(vi.) Increase of aerial activity and occupation of empty aerodromes

(vii.) Increase of anti-aircraft activity. Sections of A.A. guns should move frequently and reinforcements should be temporarily brought up.

(viii.) Increase in signal activity.

(ix.) Tank detrainments and tracks.

A large use should be made of dummy works, but care must be taken to ensure that tracks to them are made and kept up.

In considering the question of the concealment of the preparations for the actual attack, it is advisable to differentiate between:—

(a) Preparations which can be made as part of the normal defensive system of the sector; and

(b) Preparations which cannot thus be concealed.

Work in connection with (a) should be carried out first, and should be spread over a considerable period to avoid attracting attention.

The sites on which work in connection with (b) is to be carried out should be camouflaged, if possible, in good time, but the actual work should not be begun until the latest moment; the preparations which are most difficult to conceal should be carried out last.

The actual time which is required to make these preparations will be governed:—

(a) By the necessity for avoiding any sudden and large increase in the normal activity of the sector; and

(b) By the increased danger of their discovery by the enemy if they are protracted over a long period. Any registration which may be necessary for the reinforcing artillery must be carried out unobtrusively and in the guise of, or under cover of, normal artillery fire.

In order to ensure the efficient execution of these preparations, careful programmes should be drawn out before any of the proposed work is begun, shewing:—

(a) The work to be done;

(b) The labour available;

(c) The proposed methods of concealing the work;

(d) The dates on which work will have to be started in order to be ready by the day of the attack.

Section 2.—Preparations in the Forward Area.

In making the necessary preparations in the forward area, the importance of concealment must be impressed upon all ranks. Sites on which work is to be undertaken should be camouflaged before the work is begun. Great care must be taken to make as few new tracks as possible.

The preparations will include:—

(a) Formation of ammunition, tank and engineer dumps.

(b) Construction of artillery positions and of trench mortar emplacements.

(c) Accommodation for troops.

(d) Assembly positions.

(e) Selection and preparation of headquarters and of observation stations.

(f) Rations, forage, engineer stores, water, etc.

(g) Signal communications.

(h) Medical arrangements.

(i) Traffic control.

(a) *Formation of Ammunition Dumps.*—The amount of additional ammunition required will depend upon the nature and extent of the attack which is to be delivered. If it is decided to carry out the attack after comparatively little artillery preparation, the necessity for the provision of many new ammunition dumps will be obviated. At the same time, it is

certain that a number of new dumps will be required. The greatest precautions must be taken with regard to their formation, not only to hide them from the enemy's observation, but also to protect them against the enemy's artillery fire. The explosion of numerous ammunition dumps is a tolerably certain indication of an impending attack. It is also important to prevent comment by the civilian inhabitants of the district. The storage of ammunition for the attack, therefore, should be made to fit in with the ordinary defensive arrangements of the sector. New dumps should be made as long as possible before the projected offensive and at other places than on the particular front where the attack is to take place. No increase of lorry traffic or of horse transport should be allowed by daylight. In view of an advance, ammunition should be stored as far forward as can be arranged. It should be carried forward at night and stored, whenever possible, in existing shelters, cellars and dug-outs. All new work should be carefully camouflaged.

(b) *Construction of new Artillery Positions and Trench Mortar Emplacements.*—The remarks contained in the preceding paragraph with regard to secrecy apply equally to the construction of new artillery positions and trench mortar emplacements. Great care must be taken to prevent the enemy from observing the arrival of reinforcing artillery and trench mortars. Any new positions and emplacements which may be required must be constructed, therefore, in an inconspicuous manner, and every precaution must be taken to hide tracks and new work. In some cases it may even be advisable to withdraw the greater part of the gun detachments after the guns have been placed in position in order to prevent the appearance of any tracks or signs of activity in the vicinity of the guns.

Sites for new gun positions and trench mortar emplacements should be chosen a long time before the projected attack. If old gun pits are used for reinforcing artillery, no attempt should be made to repair them. New emplacements for trench mortars, should be constructed, wherever possible, in the trenches. A slight increase in the width of a trench is considerably less conspicuous as a rule than a new emplacement.

It may sometimes be advisable to bring a large number of guns and trench mortars into position in the open a few nights before the attack and thus to reduce to a minimum tracks and other signs of occupation.

(c) *Accommodation for Troops.*—All movements of large bodies of troops and all marches necessitated by the changing of billets in the back areas should be carried out by night. Camps, wherever possible, should be made in woods. Transport and artillery should never be parked in open fields, but under trees and along hedges. Advantage should be taken of the cover provided by farmyards and villages. All lights must be carefully screened. An officer should be detailed for each camp in the divisional area, who will be responsible for the maintenance of all rules and regulations and for seeing that the arrangements for protection from observation from the air are complete.

In the forward area it will be out of the question, if the preparations for the offensive are to be kept secret from the enemy, to dig new trenches or to construct a large number of new dug-outs for additional troops immediately before the attack. It follows, therefore, that any increase of accommodation must be made as long as possible before it is required, or that the existing accommodation should be made to suffice. The necessity for providing additional accommodation will naturally vary in every sector. In an old-established trench system with a network of trenches, or in a sector which is well supplied with dug-outs, little additional accommodation should be necessary. On the other hand, in a sector where there are few trenches, it is probable that a con-

considerable amount of work will be required before the attack. As a general principle, however, it must be assumed that unless the construction of additional accommodation can be begun some weeks before it is required, the only available accommodation for the assembly of troops will be the trenches, dug-outs and shelters already in existence. If the preparation of new accommodation is begun in good time, it should be continued until the last minute before the attack takes place, as a sudden cessation of work in a sector where work has been in progress may alarm the enemy and put him on his guard.

(d) *Assembly Positions.*—Assembly positions and forming up places for the infantry and tanks should be clearly marked with tapes on the night before the attack. (See Part I., Section 6.)

(e) *Selection and Preparation of Headquarters.*—It is of great importance that a commander should be able to overlook the ground over which his troops are to attack. The battle headquarters of formations and units must be pushed as far forward as conditions permit. They should be chosen with a view to the facilities afforded for communications and should usually be in the vicinity of good observation stations. They should provide sufficient accommodation for the liaison officers from other formations or units.

(f) *Rations, Forage, Engineer Stores, Water, etc.*—The formation of reserves of rations, forage, engineer stores and water must be carefully controlled as the enemy may obtain from them useful indications of a coming attack. They should be placed in specially made or natural excavations and covered with tarpaulins or camouflage. In order to prevent undue traffic by day, their distribution will have to be carried out by night. This will require considerable arrangement.

(g) *Signal Communications.*—The importance of good signal communications before and during the attack cannot be over-estimated.

The most careful preparation is necessary before the assault takes place in order that all arrangements may be made for pushing forward communications as soon as the advance begins.

Arrangements should be made for keeping up lateral communication with flanking formations and units.

The possibility of a rapid advance should always be borne in mind, and preparations must be made to get stores up quickly in anticipation of such an eventuality.

The divisional signal company commander, therefore, must be in close touch with the general staff of the division and the main routes in the enemy's country along which communications will have to be established must be arranged beforehand and marked on the map. It will be impossible, as a rule, if the preparations for the attack are to be kept secret from the enemy, to bury additional cable or to extend an existing buried cable system, but the necessity for buried lines will be largely obviated when the attack is delivered as a surprise after a comparatively short bombardment. Increase of signal traffic before the attack should be avoided, and strict discipline must be enforced with regard to conversations by telephone and wireless messages. In order to economize man-power and to promote efficiency, it is of great importance to concentrate entirely upon essential communications. In preparing for an offensive, therefore, commanders of formations should decide their minimum requirements in respect of communications during operations, and also the order of priority in which additions and extensions of communications should be made when the advance comes to a standstill. Telephones must be reduced to the lowest possible number in order to save labour and transport.

The following means of communication will normally be available :—

(i.) *Cable.*—Every effort should be made to establish telephonic or telegraphic communication as far forward as battalion headquarters. In establishing these communications, the arrangements which will be required, as the attack progresses, must be taken into account. Cable sections must be held in readiness to follow the advance of the infantry.

(ii.) *Visual.*—Points where it is proposed to establish stations in the enemy's lines should be located approximately by reconnaissance and by the study of the map. Back stations in our own lines must be selected and prepared.

(iii.) *Pigeons.*—Before the attack, pigeons should be allotted to all attacking units. In addition to the pigeons at battalion headquarters, it should be feasible to allot a few pigeons to each F.O.O. and company commander. All officers and as many non-commissioned officers and men as possible should be instructed how to write messages in the Pigeon Service Message Book, Army Book 418, also how to roll the message form and to place it in the carrier, to affix the carrier to the bird's leg, and the manner in which a pigeon should be tossed. Pigeons should be reserved for important messages, but it must be remembered that the birds must not be kept for more than forty-eight hours away from their lofts. A tab shewing the hour before which the pigeons must be liberated should be attached to each basket.

(iv.) *Message-carrying Rockets.*—These will usually be employed for sending messages from the infantry in the front line or from F.O.O.s to the rear or between fixed points. If possible, all officers and runners should be instructed in their use. Their employment will be regulated by divisional headquarters.

(v.) *Wireless.*—The scheme for employment of wireless (including power buzzer and amplifier) must be organized, and sets will be allotted to units and formations, under the general supervision of the corps.

(vi.) *Runners.*—Runners should only be used when other means of communication fail. They should be carefully chosen and should be trained in map reading and in the use of the compass. They must be familiar with all routes to the various headquarters, etc., within their battalion and brigade sector and on the flanks. Where messages have to be carried for long distances by runners, relay posts will be necessary. Such posts should be established as the advance proceeds. They should be clearly marked with notice boards and at night with lamps.

(vii.) *Mounted Orderlies and Cyclists.*—Mounted orderlies and cyclists should be attached to brigade headquarters to accompany the infantry in the advance. In the case of artillery, the more open the fighting and the more rapid the advance, the more will artillery commanders be obliged to rely for information upon personal reconnaissance, officers' patrols and mounted orderlies.

(viii.) *Messenger Dogs.*—A group of messenger dogs (two keepers and six dogs) should be assigned, if possible, to each battalion headquarters. Their employment as message carriers may save the use of runners. It should be remembered, however, that dogs should not be kept for more than twelve hours at a forward station away from their keepers. Dogs should be allotted to definite companies and should always be released separately.

(ix.) *Accommodation for Signal Personnel.*—The efficient working and maintenance of communications depend largely upon the accommodation available for the personnel engaged in working them.

Commanders must not forget this point when establishing head quarters in a captured position.

(h) *Medical arrangements.*—The positions of hospitals, dressing stations, regimental and artillery aid posts must be selected. Their situation, and also the localities to which they will move during the course of the attack, must be made known to the troops. Arrangements should be made for the establishment of soup kitchens at all advanced dressing stations.

In order to preserve secrecy, the erection of a large number of hospital tents and huts should be avoided, or postponed until as late as possible before the attack. It is also undesirable to put up notice boards, indicating the positions of hospitals, dressing stations and aid posts and the routes to them, until the last moment.

(j) (i) *Traffic control.*—The D.A.P.M. should be given early information of an impending offensive, as the success of operations will depend largely upon the uninterrupted passage of ammunition and supplies to the front and of ambulances to the rear. The supervision of traffic, therefore, will require careful organization and strict regulation. The responsibility of formations and units as regards traffic control must be clearly defined. The instructions respecting the restriction of movement must be made known to all troops as they arrive in the area. The erection of numerous notice boards during the period immediately preceding an attack militates against secrecy, and should consequently be avoided. If it is found necessary to erect notice boards to facilitate the movement of troops to their assembly positions, their erection should be deferred to the last possible moment. Guides should be detailed to conduct parties to their destinations, and directing posts should be established at cross roads, trench junctions, etc. (For further information with regard to traffic control, see Appendix F.)

(ii) *Stragglers' Posts.*—Two lines of posts should normally be formed. They should be established along well defined lines, and should be located on all probable traffic routes. The forward posts should consist of regimental police stationed in rear of their units.

A collecting station should be established in some central position where all stragglers should be collected and sent back to the transport lines of their units. They should be then sent forward with the ration parties, after having been fed and, if necessary, re-equipped.

(iii) *Evacuation of Prisoners.*—Escorts for prisoners as far as brigade headquarters should be provided from the fighting troops. Such escorts should be as small as possible (see Appendix (H)). Arrangements for the collection and removal of prisoners from the headquarters of brigades to the divisional cages must be made by the divisional staff.

Section 3.—Reconnaissance.

(See also F.S.R., Part I, Section 96.)

Before an offensive the positions which are to be attacked should be carefully reconnoitred by commanders and their staffs. In reconnoitring a position with a view to attack, the following points should be particularly noted:—

- (i) The nature and conformation of the ground on the flanks of the attack.
- (ii) Tactical features the capture of which is essential to the success of the operations, and the best means of approach to them.
- (iii) Strong points in the enemy's defensive system and the most suitable method of dealing with them, i.e., by direct attack or by envelopment.

(iv.) Prominent features which may assist the attacking troops in keeping direction, and also those which may lead to the loss of direction.

(v.) The existence of any obstacles and the best means of negotiating them.

(vi.) Suitable artillery positions and observation stations.

Section 4.—Issue of Instructions, Operation Orders and Maps.

1. *Instructions.*—(i.) As soon as the divisional commander has been allotted his task by the corps commander and informed generally of the artillery plan, he should carry out the necessary reconnaissance. He should then form his own plan, which should include the general disposition of the attacking troops before the assault, the task to be carried out by each body of infantry under his command, and his intentions with regard to the action of his reserves.

(ii.) When this plan has been approved by the corps commander, it should be issued immediately to subordinate commanders, in the form of a memorandum, together with any information available as to the action of the divisions on either flank.

This is a warning order, and the earlier it is issued, the more time there will be for subordinate commanders to make their plans and arrangements unobtrusively.

(iii.) The divisional staff should then work out the necessary details to give effect to the plan outlined in the memorandum, and should issue them in a series of "Instructions." Copies of divisional instructions should only be issued to those whose duties require that they should know what the instructions contain.

(iv.) The following points should be dealt with in these instructions:—

(a) Work required to organize for the attack the divisional defensive system, including the construction of battle headquarters and observation stations, and the improvement and development of existing accommodation and communications.

(b) Assembly areas, and the allotment of tracks and trenches.

(c) Artillery plan, including preliminary bombardment, barrages, time tables and liaison, and organization into groups.

(d) Employment of machine guns.

(e) Allotment and employment of engineers and pioneer units after the assault, and preparations for taking forward engineer material and stores.

(f) Signal communications.

(g) Co-operation with R.A.F.

(h) Action of tanks.

(i) Intelligence arrangements, including the disposal of prisoners of war and captured documents, and the arrangements for obtaining, sifting and distributing information concerning the enemy.

(j) Maps to be carried.

(k) Liaison officers.

(l) Number of officers and other ranks to accompany assaulting battalions.

(m) Appointments of understudies for staff and nomination of officers to command in the event of casualties. This will be issued confidentially to those whom it concerns.

(n) Fighting kit, including ammunition, flares, rations, etc., to be carried, and arrangements for storing surplus kit.

(o) Administrative arrangements, including the formation of ammunition, store, ration and water dumps, and arrangements for keeping them filled.

(p) Medical arrangements.

(q) Police arrangements for traffic control in the forward area, and for stragglers' posts.

(r) Arrangements for synchronization of watches.

The order in which these points have been enumerated must not be considered as the order of relative importance, *e.g.*, medical arrangements should be issued very early to enable the necessary work to be carried out.

(v.) As the divisional instructions are received, commanders of lower formations will issue such portions as affect the troops under their command.

2. *Operation Orders.*—(i.) Operation orders should be based on the principles laid down in F.S.R., Part I, Section 12. They should be kept as brief as possible. "An operation order should contain just what the recipient requires to know and nothing more."

(ii.) Divisional operation orders should give:—

(a) Such information with regard to the enemy as will affect the recipients of the orders.

(b) Information with regard to other troops who are to take part in the attack, including the general objectives of the corps and of the divisions on the flanks, etc.

(c) A brief summary of the intentions of the divisional commander.

(d) The objective of the division and the objectives of the assaulting brigades.

(e) The particular instructions for those to whom the order is issued.

(iii.) Orders for the move of the attacking troops into the assembly area should be issued separately. Zero should also be notified separately.

(iv.) Orders must be kept as secret as possible. It is important, therefore, that they should not be issued to the troops until the last possible moment. At the same time, it is essential that officers and men who are to take part in an attack should understand thoroughly the tasks which have been allotted to them and the action which they are to take. Orders, in ordinary circumstances, should reach brigade headquarters not less than thirty-six hours before zero, and orders as regards attack barrages should reach batteries at least twelve hours before zero. It must be realized, however, that attacks, especially as the battle progresses, have often to be hurried in order to seize fleeting opportunities. After the initial attack only a short time, as a rule, will be available for the preparation of orders and for their transmission to the troops, if the first successes are to be developed. In these circumstances, subordinate commanders should be informed as early as possible of the general scheme of the proposed operations by means of written or verbal instructions, so as to enable them to make their preliminary arrangements. The actual operation orders will be issued later. Subordinate commanders must anticipate their orders, as far as possible, by continually carrying out reconnaissance and forwarding preparations.

3. *Maps.*—All officers and non-commissioned officers should be provided with accurate maps of the enemy's trench system and of the country through which it is proposed to advance. Company and platoon commanders should also be supplied with such portions of the artillery barrage map as affect the part of the front over which they will have to advance. In open warfare troops must use 1: 100,000 map.

Section 5.—Concentration of Troops.

The concentration of troops for the attack will generally take place by night, and should be conducted under the close personal supervision of the staffs concerned. The most strict precautions must be taken to maintain

secrecy. Troops must not be allowed to move about in the open by day. Fires and lights must be extinguished by night. Special arrangements should be made for detachments of guides. It will be inadvisable, if secrecy is to be maintained, to mark the various routes of approach and assembly positions until the day before the attack, but guides should be perfectly familiar with them. Secret maps, shewing routes (including special routes for tanks, etc.) and assembly positions, should be provided and distributed to the following:—

(a) The attacking infantry.

(b) The artillery units, machine gun and trench mortar units which are to accompany the infantry in the advance.

(c) Any guns or trench mortars which may be brought up to forward positions the night before the attack takes place.

(d) Any detachment of engineers and pioneers detailed to accompany the artillery or to carry out special tasks.

(e) First line transport, for the concentration and moving forward of which careful arrangements must be made. The most rigorous march discipline must be enforced.

(f) Tank units.

Section 6.—Assembly of Troops.

The assembly of troops for an assault requires the most careful preparation, as the success of the operation depends in a great measure upon the manner in which the assembly is carried out. The main principle to be observed is that troops should reach the positions from which they are to begin the attack fresh and within as short a time before zero as can be arranged.

The routes leading to these positions must be definitely allotted to the various units and properly controlled. At points where units are liable to lose their way control posts should be stationed. The actual positions from which the attack is to be launched should be marked with tapes; the flanks of units should also be clearly indicated by tapes.

During the approach march and assembly, the front must be protected by strong patrols in order to prevent the enemy from discovering and disturbing the movement of troops. This patrol activity should be developed some considerable time before the assembly begins in order not to excite the enemy's suspicions. Bayonets should not be fixed until the last possible moment before zero.

The probability of the troops having to pass through an area shelled with gas must always be borne in mind, and all the necessary precautions must be taken before the approach march begins.

PART II.

CHAPTER 4.—EXECUTION OF THE ATTACK.

Section 1.—General Considerations.

The battle will usually begin with an attack on a defensive system organized in depth. When defences of this nature have to be overcome, the infantry will require as full a measure of assistance as it is practicable for the other arms to provide. The idea must not be allowed to gain ground, however, that an offensive operation is impossible under any conditions without a barrage of great density or without the co-operation of tanks. To achieve success in battle, the infantry must beat the enemy's infantry. The infantry must never for a moment be permitted to consider that it merely exists to follow up an artillery barrage or to accompany a "tank attack." The barrage must be so organized as to help any change of direction which the

infantry has to make. Troops are trained to keep up to the barrage and can only do so by conforming to its shape. Curves and irregularities in the barrage, therefore, must always be avoided as they are apt to cause loss of direction.

The formation of a salient as the result of an initial penetration of the enemy's defensive positions must be followed by prompt and vigorous blows on the flanks of the salient. Continued pressure in one direction without a corresponding extension of base must result in lack of manœuvring space and ever-increasing difficulty of communication, leading more and more rapidly as the advance proceeds to the weakening and disorganization of the attacking troops. Quite weak forces will eventually check the advanced guards of an army the communications of which are stretched to breaking point.

When, after the more or less open fighting which follows the first penetration of the enemy's organized defences, the defence begins to increase in stability, it is probable that the attacking infantry will often be required to push forward with a much reduced measure of support from its assistant arms. In such cases, opportunities for making progress by night operations must be looked for and seized, *e.g.*, by night advances to cross exposed ground, or to surround or to penetrate between centres of resistance; or, where conditions are favourable, by local attacks under cover of darkness to capture some tactical locality the possession of which is of especial importance.

Every effort must be made to harass the enemy without intermission and to prevent him from withdrawing his troops to prepared positions in rear.

Section 2.—Preliminary Bombardment.

The decision as to whether or not the attack is to be preceded by a preliminary artillery bombardment will depend mainly upon the following conditions:—

- (a) The possibility of effecting a complete surprise.
- (b) The suitability of the country for the employment of tanks.
- (c) The numbers and moral of the enemy's troops.
- (d) The nature and organization of the enemy's defensive system.

If the conditions are favourable, it may be advisable to dispense entirely with a preliminary bombardment, and to rely upon other means, such as tanks, to crush passages through the enemy's wire and to prepare the way for the assaulting infantry. In this case, the artillery will only open fire as the attack begins, and especial attention will have to be given to the neutralization of the enemy's batteries. If, on the other hand, it is decided that artillery preparation is required, the duration of the bombardment should be as short as is compatible with the effective execution of the tasks assigned to the artillery. The shorter the preliminary bombardment, the less time will the enemy have to collect his reserves and to make his preparations for the attack.

In order to be effective, however, a short bombardment must be of extreme violence. Its aim should be not so much the destruction of the enemy's defences as the demoralization of his troops, the neutralization of his artillery, trench mortars and machine guns, wire cutting and the destruction of his observation stations, command posts and centres of communication.

The fire of the artillery and trench mortars should not be evenly distributed over the entire front of the attack, but must be designed to bring a concentrated fire to bear upon points where it is intended to break through the enemy's defences. The depth of the bombardment will depend upon the depth and nature of the enemy's defensive system, but it should always be sufficiently deep to cover the zone of the enemy's field artillery positions. If the enemy's line of resistance is so far withdrawn that his guns which cover it

are out of range of the artillery supporting the attack, a preliminary operation will probably be necessary in order to enable the latter to be brought forward. Special measures will have to be taken to deal with the enemy's alternative gun emplacements and arrangements must be made to have guns as far forward as possible if the enemy's outpost system is known to be deep and lightly held.

The fire of long-range artillery must, of course, be applied so that full value is obtained from such natures of ordnance. Every round expended on a definite plan, even at extreme ranges, is well spent.

The various tasks of the artillery must be carefully allotted, and careful consideration must be given to the proportion of guns to be employed on the bombardment of the enemy's defences and on counter-battery work respectively at various stages of the artillery preparation and of the attack. (For more detailed information with regard to the preliminary bombardment, see Appendix (A)).

Section 3.—Frontages and Formations.

(a) *Frontages.*—(i.) The allotment of frontages for the attack must be governed by the principles enumerated in Field Service Regulations, which have been fully borne out by the experience of the present war.

It is laid down in Field Service Regulations that an attacking force "may be disposed in varying strength along the front, according to the nature of the ground, the frontage varying from one to three or more men per yard", but that "a smaller force than from three to five men per yard on the front on which the decisive attack is to be delivered will rarely prove sufficient, this force being distributed in such depth as circumstances make advisable" (F.S.R., Part I, Section 104, 3).

(ii.) In applying the principles laid down in Field Service Regulations, the following factors should be taken into consideration:—

- (a) The depth of the objectives.
- (b) The nature of the enemy's defences and the amount of resistance to be expected.
- (c) The tactical importance of each sector of attack.
- (d) The state of the ground.

(iii.) Although the principles above referred to still hold good, commanders must use their discretion in applying them to the different sectors of a large front, basing the disposition of their troops—(a) on the necessity of continually providing fresh impetus to carry on the attack, and (b) on the importance of allowing the leading units a sufficiently wide frontage on which to attack without undue rigidity. It merely restricts the power of manœuvre and entails unnecessary casualties if troops are crowded into the front line on a too narrow frontage.

(iv.) The frontages allotted to units in the attack must be governed by the necessity for disposition in depth:—

Disposition in depth is required:—

(a) To enable a commander to take immediate advantage of any local success gained by his leading troops. If his force is disposed in depth, he will be able to move forward his reserves rapidly in order to develop a success, or to strike a vigorous blow against any weak point in the defender's line which may be disclosed during the advance.

(b) To replace losses among the leading troops and thus to carry forward the attack without interruption.

(c) To facilitate control and to prevent the premature exhaustion and disorganization of the troops.

(d) To protect the flanks and rear of the leading troops.

(e) To meet counter-attack

(v.) It is obvious that frontages if unduly extended, and if dispositions are not soundly conceived, may so limit distribution in depth as to bring about the intermingling of units during the attack. This is likely to lead to confusion and will increase the difficulty of reorganizing units.

Comparatively wide frontages, however, do not necessarily entail these disadvantages. The minor fire units must, of course, be given sufficiently narrow frontages to facilitate control by their commanders. The larger units (companies and battalions) must not be given frontages so wide as to deny them the depth in distribution needed for carrying out the tasks assigned to them. Nevertheless, these requirements need not prevent the allotment of comparatively wide frontages in the attack. An increased frontage will not necessarily imply the placing of more men or more minor fire-units in the firing line; but it will mean greater intervals between the leading units. It will make for elasticity and admit of some freedom of manœuvre. It is not essential that the flanks of adjoining units should always be in actual contact, provided that suitable measures are taken for dealing with the enemy in the intervals between them.

(b) *Formations.*—The formations adopted by units in the battle must depend upon the depth of the objectives, the character of the enemy's defences, the amount of opposition which is anticipated and the nature of the country. They should be designed with a view to securing the maximum development of fire with the minimum of loss to the attacking troops combined with elasticity and facility of control.

The formation of the attacking infantry should consist of a thin firing line closely followed by the supports in open order. Behind the supports will come the reserves, which can be kept in denser formation according to the cover available and the strength of the hostile fire. They will be available to carry on the attack when the leading troops become exhausted, and to cover their flanks and to develop the successes which have been gained.

To facilitate control, troops should not be extended prematurely, but should be kept together in groups and columns as long as possible. In order to assemble troops and to keep them together, use must be made of all available cover.

Section 4.—Distribution of Troops.

The following are the main considerations with regard to the distribution of troops in the attack:—

(i.) Provision must be made for the tactical unity of battalions and companies.

(ii.) A definite rôle must be allotted to each body of troops.

(iii.) Sufficient strength must be provided for the immediate clearing of the whole area over which the leading troops have advanced.

(iv.) Sufficient strength must be provided to maintain the objectives when they have been gained and to resist counter-attack.

(v.) The commander must retain in his hands adequate reserves to provide against the unforeseen contingencies which may occur during the course of the battle.

Section 5.—Infantry Attack.

The infantry should deploy for the assault before or during the bombardment. Counter-preparation by the enemy's artillery of more or less intensity must always be anticipated, and may begin some hours before the attack. When the bombardment is to be short and intense, and if sufficient cover exists, the assault troops should be concentrated in the front system of trenches before the bombardment begins. If there is no cover, and if the light and

nature of the country admit, deployment into artillery formation should take place when the troops reach the zone of hostile howitzer fire; or, if darkness and enclosed country necessitate it, the approach march must be carried out in small bodies in column at some distance apart, deployment taking place as late as possible. By zero hour the attacking troops should be as close to the enemy's front line as the bombardment permits.

The infantry will usually advance to the attack under a creeping artillery barrage. The formations adopted will depend upon the tactical situation, but they must:—

(i.) Admit of every commander having a reserve in his own hands.

The strength of this reserve must depend upon circumstances, but should usually be about a quarter or one-third of the force under his command.

(ii.) Admit of the rapid development of a heavy volume of fire.

(iii.) Facilitate manœuvre.

(iv.) Offer the least vulnerable target possible to the enemy's fire.

(v.) Enable units to be kept intact.

(vi.) Make it possible for supports and reserves to be sufficiently close up to the firing line to be able to afford timely assistance.

The infantry must advance with dash and determination, and must keep as close as possible to the artillery barrage, the pace of which must be regulated in accordance with the nature of the country and the condition of the ground. The infantry must not, however, expect that the artillery will be able to destroy all the hostile machine guns, nor must it place absolute reliance upon the ability of tanks, if they accompany the attack, completely to break down the enemy's resistance.

The infantry must always be prepared to fight its way forward by means of its own weapons, making use of all cover available to facilitate its advance. Throughout the whole course of the battle, measures must be taken to guard against the attacks of low flying aeroplanes. In order to gain fire superiority with the minimum exposure of personnel, Lewis gun sections should be pushed well forward in the attack and should make use of their rifles. Units in rear should be kept in small columns as long as possible.

The leading troops in the assault must not stop to take prisoners or to clear dug-outs; they must push straight forward to their objectives. The work of clearing dug-outs must be done by troops especially detailed for the purpose, who should follow close behind the assaulting troops in order to prevent the enemy from reopening fire after the attack has passed on. Careful arrangements must be made to maintain touch with neighbouring units and to keep direction. Commanders, however, should not be unduly nervous with regard to their flanks. As a general rule, their best way of ensuring the protection of their flanks, and also of assisting neighbouring units, will be to push forward as rapidly as possible. (See Part I., chapter 2, section 2.)

A sufficient distribution in depth must always be maintained to ensure protection against a counter-attack. Supports and reserves must be used promptly and boldly to attack the flanks of strong points where the enemy is still holding out, and to carry forward the advance. Every endeavour must be made to avoid the piecemeal engagement of units.

Although units should push forward as far as they can whenever there is an opportunity of exploiting a success (see Part I., chapter 2, section 3), a time will probably come in every attack when the leading troops will become too much disorganized to continue the advance. In such circumstances, the troops should halt to reorganize and the continuation of the attack will then depend upon the timely intervention of the reserves. As soon as the troops who have already been engaged have been reorganized, they should move forward again in support of the troops in front.

When the objectives have been gained, the attacking force should be disposed rapidly so as to ensure the maintenance of the captured ground against the enemy's counter-attacks, until the advance can be resumed.

Units should be organized, therefore, in considerable depth in formations suitable for the resumption of the attack. Scouts and patrols must be pushed well forward to seize points of tactical importance in advance of the line held, to keep touch with the enemy and to report his movements. Arrangements must be made to secure flanking fire from the machine guns, which should be carefully sited to ensure cover from observation both from the ground and also from the air. Flanks must be secured and every effort must be made to gain touch with neighbouring units. In case the enemy should attack, reserves must be in position to counter-attack. It is also essential that the communications between the infantry and the artillery should immediately be reorganized.

The method of capture of the enemy's rear systems of defence will depend very largely upon the rapidity with which his forward defences have been captured, the manner in which the initial success can be exploited and the distance which separates them from the defences in rear. They should be carried, wherever possible, by the first vigorous pursuit, for delay in their capture will involve increased cost. A short bombardment by the artillery, trench mortars and machine guns accompanying the infantry may prove sufficient if the enemy has been taken by surprise and if the advance has been sufficiently rapid and determined. If, however, the enemy has had time to bring up reserves, it will, as a general rule, be useless to attempt a further advance without adequate preparation. Hasty and piecemeal efforts to press forward are liable to cause casualties out of all proportion to the results attained. Under such circumstances, therefore, a new general attack should be arranged. If the enemy is found to hold the zone immediately in front of his new main line of resistance, the defending troops must be driven back as soon as possible in order that a firm hold may be secured on the ground necessary for the development of the subsequent attack. An active reconnaissance must then be carried out in order to clear up the situation and to determine the depth of the enemy's position and his method of holding it. A deliberate attack, after an artillery preparation or in co-operation with tanks, will then very probably be necessary.

Section 6.—Artillery Co-operation.

The artillery will cover the advance of the infantry as long as possible by a creeping barrage, by the bombardment of the enemy's defences, by the neutralization of the enemy's batteries and by long range fire calculated to hinder the assembly and advance of reinforcements or counter-attacking troops. The pace of the barrage must be governed by the probable rate of progress of the infantry, which will depend upon the formation adopted, the condition of the ground, the distance of the objectives and the opposition of the enemy. There should be short pauses during the advance to enable the infantry to reorganize before continuing the attack. In certain cases, it may be necessary to arrange sufficiently long pauses to enable some of the artillery to be moved forward and to admit of the bringing forward of reserves. But, in this connection, it must be remembered that long pauses give the enemy time to recover from the first surprise of the attack and enable him to locate the battle front. The attacking troops and tanks may consequently be exposed to more effective artillery fire.

The barrage must advance according to a prearranged time table. If signals are adopted in addition to the time table, they should be as simple and as few as possible. The neutralization of the enemy's batteries, particularly those on the flanks of the attack, must continue throughout the battle.

Some field batteries, both gun and howitzer, should be especially detailed to move forward in close support of the leading infantry battalions. They should be pushed forward by sections, or rarely as single guns, in such a manner that they are never all out of action at the same time. Their fire should be concentrated upon centres of resistance which are checking the advance.

The success of the advance will be greatly influenced by the speed with which light and heavy artillery, with a sufficient supply of ammunition, can be pushed forward, and upon the care with which artillery observation stations have been selected in advance. Some heavy artillery should be attached to each division to enable the divisional commander to deal with any situation which may arise. The moral effect caused by the sudden opening of fire by a single heavy gun may enable the infantry to penetrate effectively the rear line of defences if the advance has been rapid enough to disorganize the enemy's troops.

Throughout the whole course of the battle the closest liaison is necessary between the infantry and artillery commanders in order that the artillery may render timely assistance to the infantry. The infantry commander must keep his attached artillery informed of the situation of his leading troops by any means at his disposal. The G.O.C., R.A., of the division should be at divisional headquarters, and the artillery brigade, or group, commander, as the case may be, should establish his headquarters at, or close to, the headquarters of the infantry brigade with which he is working. If this is not practicable, an artillery liaison officer should be attached to the infantry brigade commander. (For more detailed information with regard to artillery co-operation, see Appendix A.)

Section 7.—Machine gun co-operation.

(See also S.S. 192, Part I.)

Machine guns will be employed:—

- (i.) To cover the advance of the infantry throughout the battle.
- (ii.) To bring concentrated fire to bear upon any centres of resistance which may check the advance.
- (iii.) To protect the flanks.
- (iv.) To provide a system of defence organized in depth against hostile counter-attack.

During the initial stages of the attack a proportion of the machine guns may be employed in close co-operation with the artillery to cover the assault of the infantry by means of fire directed upon the enemy's trenches, communication trenches and the ground in rear of his defensive system. The object of such fire is to keep down the enemy in his trenches, and also to interrupt his communications and to render difficult the approach of his reserves. The machine gun units should generally open fire at the moment the infantry attack begins. Careful arrangements must be made beforehand to regulate the direction and duration of the fire, as, owing to the dust and smoke, it will be impossible to rely upon direct observation. Direct overhead and flanking fire should be employed whenever possible. Indirect fire can be used effectively, however, even if there has been no time or opportunity for the employment of the elaborate methods which are used in position warfare, for the purpose of harassing the enemy's communications, routes of approach and areas of concentration.

As the infantry penetrates the enemy's lines and advances to a distance which makes it unsafe for machine gun units which have been employed in the original covering fire to continue firing, the guns which have been employed for this purpose should be moved forward in divisional or brigade reserve.

The ability of machine guns rapidly to develop a strong volume of fire must be utilized by sending forward machine gun units in close support of the attacking infantry to cover its advance. Their guns should be employed to bring a heavy fire to bear upon hostile strong points and localities which are delaying the attack, to break up counter-attacks and to form centres of resistance on which the infantry can rally in case the leading troops are driven back by the enemy. Machine guns, therefore, should not generally be in the actual firing line. They should be moved forward by bounds to positions from which they can be employed effectively and immediately wherever the situation may demand. Machine gun commanders must keep in close touch with the infantry commanders.

Throughout the advance, machine gun units must make full use of the ground. Their objectives should be points from which direct overhead and flanking fire can be brought to bear upon the enemy.

It will be difficult for the machine gunners to accompany the advance for any distance if they are themselves obliged to carry their guns and ammunition. When the situation and the nature of the ground permit, therefore, the guns and ammunition must be moved forward on limbered G.S. wagons or pack transport. Arrangements must be made in advance to ensure that the transport is in readiness for the advance. The routes which are to be followed by machine gun units must be carefully considered from the point of view of concealment and of the facilities which they afford for transport.

As soon as the infantry has reached its objectives, or whenever the advance pauses, machine guns should be distributed in defensive positions in depth. Particular attention must always be paid to the protection of flanks and the defence of tactical localities.

Section 8.—Trench Mortar Co-operation.

Medium and heavy trench mortars should be used in the preliminary bombardment and during the early stages of the attack to destroy the enemy's wire and to assist the artillery in the destruction of the enemy's close defences.

After the preliminary bombardment, arrangements should be made to move forward medium trench mortar batteries as quickly as possible. It will probably be convenient to attach them to infantry brigades during the advance, moving them forward by bounds to prearranged positions close behind the infantry. They will then be able to support the infantry, if necessary, in its farther advance. The routes of advance to the selected positions must be made known to the batteries. Careful prearrangement will be necessary for the maintenance of the ammunition supply.

Light trench mortar batteries should accompany the infantry in the attack and be pushed forward boldly in close support of the attacking infantry. It will generally be advisable to attach trench mortar units to battalions during the advance. The chief difficulty will be the supply of bombs. These should be carried forward on pack animals.

Section 9.—Tank Co-operation.

(See also S.S. 214.)

The duties of tank units are:—

- (i.) To assist the advance of the infantry.
- (ii.) To exploit a success.

They can also be employed, if necessary, to carry up ammunition, stores, etc., to the infantry.

In the preparations for an attack in which tanks are to be employed, due regard must be paid to concealment from view and cover from artillery fire

during the approach marches. This is necessary in order to protect the tanks and also not to disclose to the enemy the point of the impending attack.

Close liaison is necessary between infantry commanders and tank units. Time must be allowed, therefore, for the establishment of this liaison. Commanders of tank units should have their headquarters at, or close to, the headquarters of the formations with which they are working.

Commanders to whom tanks are allotted should consult the tank officers as to the practicability of employing tanks for any operation. In this connection, especial attention should be paid to the possibility of giving to the tanks effective artillery support and protection.

Tank units co-operating with infantry should be allotted definite objectives. These objectives should correspond with the objectives allotted to battalions of infantry. The routes to them should be settled before the attack begins.

Tanks can be employed in co-operation with infantry either with or without a preliminary bombardment. In the former case, tank units will either precede the infantry, covering its advance with fire, overrunning the enemy's machine guns and clearing gaps in the hostile wire, or they will follow in close support of the infantry, moving forward at once to engage the enemy at any points where the infantry is checked. In the latter case, the duty of the tank units will be to lead the advance and to crush a way for the infantry through the enemy's wire.

For continuous operations, tanks must be disposed in depth and a regular system of reliefs must be instituted from the beginning of the attack in order to allow tank units time for adequate reorganization after an assault. This is necessary, because the employment of the same units for the assault on successive days leads to complete disorganization and loss of fighting power. It is also important that the tank commander should keep in his own hands a reserve to enable him to deal with any unforeseen situation which may arise. This reserve should be in addition to local reserves acting under the infantry commanders to whom tanks have been allotted.

The infantry must take instant advantage of the effect produced by the tanks, and must close with the enemy as rapidly as possible. If the tanks break down, the infantry must fight its way forward with its own weapons. Lewis gunners should be ready to protect tanks when the latter are attacked by the enemy's artillery in the open.

As soon as the infantry assault has been successfully carried out, the tanks should be immediately withdrawn under cover.

For the exploitation of any success which may be gained, a special force of medium tanks should be kept in hand. The action of these tanks will be dependent upon timely information as to progress of the battle.

When the attacking force has succeeded in breaking through the enemy's organized defences and is advancing to a general line of objectives under the conditions of open warfare, the tactics of the tanks, owing to the difficulty of locating the enemy's artillery positions, can no longer be approximated to those of the infantry. Tanks consequently should not be employed at this stage of the battle as part of the advanced guards or of the leading attacking lines. If they are so used, favourable opportunities will be given to the enemy's rearguard artillery, boldly handled, to engage them at short or medium ranges, and to put them out of action by direct fire. In such a situation, therefore, the tanks should be rallied after the enemy's organized defences have been passed, grouped as may be necessary, and should be kept comparatively close behind the advancing troops ready for employment against any strong centres of resistance which

may form an obstacle to the general advance. When such centres of resistance are encountered, the closest co-operation will be necessary between the commander of the formation concerned and the tank commander, in order that an attack may be rapidly organized. It is essential, however, that any such operation should take the form of an organized attack, that the co-operation of the several arms should be ensured, and that the tanks should be used as a concentrated force of such size as may be necessary. Protection by means of a shell or smoke barrage must be arranged for the tanks.

Should the enemy's defence be entirely broken and his troops demoralized, it may be possible to push forward tanks and armoured cars boldly in pursuit. In these circumstances, tank units must not hesitate to advance far ahead of the infantry. Medium tanks, where available, should be used for this purpose, if possible, in co-operation with cavalry. If it is impossible for the cavalry to advance, the tank units should move forward independently to a definitely arranged distance, in order to exploit the situation.

Medium tanks should be kept in rear of the attack until the infantry and heavy tanks have created a suitable opportunity for their employment. When such an opportunity arises, the medium tank units should pass through the heavy tanks and carry out the pursuit.

They should endeavour :—

(a) To break up the enemy's reserves and to demoralize his defeated troops; and

(b) To disorganize his staff arrangements and communications.

When medium tanks are used to seize tactical points in advance of the infantry pursuit, lightly equipped infantry should be pushed forward as quickly as possible to support and to relieve them.

Horse or field artillery must be used to support the independent action of tanks.

Section 10.—Cavalry Co-operation.

Cavalry will be used to complete the enemy's defeat after he has been driven out of his last organized defensive system by the other arms, or whenever a favourable opportunity may arise. Its duties will be to develop the success to the utmost limit by harassing the enemy's retreat, and by breaking up his communications. The moral effect of cavalry, combined with the fire of its horse artillery and machine guns, must be exploited to the full, but men and horses should not be frittered away on minor enterprises and no unnecessary detachments must be made. A certain amount of opposition from rear guards and machine gun detachments will have to be overcome. Risks must be taken, for in a pursuit time is of vital importance. A vigorous offensive must be conducted against certain definite objectives. The mass of the cavalry must push through gaps and weak places wherever they can be found and attack the enemy in flank (see F.S.R., Part I., Section 112).

All supporting cavalry must be close behind the leading troops ready to take advantage of any opportunities which may arise. The supporting infantry also should be close on the heels of the cavalry either to occupy captured ground or to assist the cavalry in breaking through any determined resistance.

Horse artillery must be boldly used. The utmost rapidity of action is essential and consequently the closest liaison must be maintained between the horse artillery commander and the leading troops of the cavalry formation.

Section 11.—Aircraft Co-operation.

The duties of the R.A.F. in the attack fall under two heads, (a) offensive action and (b) reconnaissance :—

(a) *Offensive Action.*—(i.) The essential preliminary to all other aerial work is to gain at least a local and temporary superiority in the air. Unless this is done, not only are the machines prevented from accomplishing their many other duties, but the enemy's machines are able to co-operate with his infantry and artillery and to harass the attacking troops without interference.

The chief means of obtaining such a superiority is by a bold use of offensive patrols designed to drive back hostile machines and to force them to fight at a distance behind their own lines. A vigorous offensive directed against the enemy's aerodromes from a low altitude at dawn on the day of assault is a supplementary and valuable method of gaining superiority.

(ii.) Once aerial superiority has been established, offensive action against the enemy's troops and transport by means of machine gun fire and bombs by low flying machines under the protection of high patrols becomes feasible and must be vigorously undertaken. Whenever possible, machines must be especially detailed to deal with anti-tank guns.

Attacks by low flying aeroplanes, however, are expensive in machines and casualties to personnel. They should be restricted, therefore, to occasions when really favourable targets are presented, e.g., during the few hours following a surprise attack when there is sure to be a great deal of movement and confusion behind the enemy's lines. Every effort must be made to keep the R.A.F. constantly informed as to the progress of the battle.

(iii.) Offensive action against the enemy's communications must be carried out by bomb raids, but it is usually best to defer such action until a few hours after the assault has been launched, i.e., not until such time as activity on his communications is likely to begin.

(b) *Reconnaissance.*—Reconnaissance includes :—(i.) Reconnaissance of the positions and the advance of the attacking troops. This is carried out by contact patrol machines, and is one of the principal means by which the commander is kept informed of the progress of the battle and is enabled to judge the right moment to send up reinforcements or to engage his reserves. It is essential, therefore, that the infantry should render the observer all the assistance in its power by giving him the approved signals when he calls for them.

When machines are available, a certain number may also be employed to drop ammunition, etc., to troops in isolated situations when it is difficult to supply them by other means.

(ii.) Reconnaissance of the enemy's dispositions and movements. This is carried out by the artillery machines, the principal duty of which is to report favourable targets and active hostile batteries to our artillery, and also by the counter-attack patrol machines which watch for hostile concentrations and the movements of the enemy's supports and reserves in order to warn the infantry and artillery whenever there are signs of the development of a counter-attack.

The instructions for contact and counter-attack patrols are contained in Appendix (B).

Section 12.—Information.

(i.) *Situation Reports.*—“All subordinate commanders are responsible for keeping their respective superiors, as well as neighbouring commanders, regularly informed of the progress of events and of important changes in the situation as they occur.” (F.S.R., Part I., Section 8 (2)).

The importance to a commander of rapid and accurate information from his subordinate commanders cannot be overestimated. The omission to keep superiors informed of the situation may not only lead to the loss of opportunities of exploiting success, but may be a direct cause of failure. Situation reports must be clear and concise, and the importance of stating in them the hour of despatch must be impressed upon all officers and non-commissioned officers. It must not be forgotten that it is just as important to send negative, as it is to send positive, information. It should be a rule in every formation that messages sent by telephone should be confirmed either by a written message or by a telegram. As speed in delivery is essential, it will often be quicker for commanders in the front line to send back their situation reports marked on a map. Message maps, therefore, must be issued down to platoon commanders before the attack is launched. Important messages should always be sent by more than one channel of communication.

(ii.) *Reconnaissance by Staff Officers.*—Although it is the duty of subordinate commanders to keep their superiors informed of the situation, this does not relieve superiors of the responsibility of obtaining the earliest possible information as to the situation by every means in their power.

To obtain information the fullest use should be made of staff officers, who must be sent to ascertain the situation, and the general conditions prevailing in the forward area.

All officers of the staff, both administrative and personal, as well as the general staff, are available for this work. It should be their endeavour to keep their commander constantly and fully informed as to the nature of the fighting, the extent to which the troops have become engaged, the approximate number of casualties, the degree of resistance which is being encountered, the difficulties (if any) of the ground over which the advance is being made, the state of the roads, and any other points which will assist him in deciding upon his further plan of action.

Staff officers of higher formations working in the battle area should always report, after reconnaissance, to the commanders of the troops whom they have visited, in order to afford the latter any information they have acquired and to obtain their views as to the situation.

(iii.) *Observers.*—The use of special observers, posted in positions from which they can watch the progress of the assault, is a useful means by which to obtain early information as to the progress of the battle. (See Appendix (D)).

(iv.) *Liaison Officers.*—The duty of a liaison officer is to keep his own commander constantly informed of the progress and situation of the formation or unit to which he is attached. Every liaison officer should be provided, by his own formation or unit, with some means of signal or other communication.

Bodies of troops in reserve, while held in readiness to take their part in the attack, will usually find it of the greatest value to have a liaison officer at the headquarters of the formation in whose sector they are likely to be required to operate.

Similarly, to ensure that neighbouring commanders are kept regularly informed as to the progress of events, it may be necessary for assaulting brigades and battalions to exchange liaison officers (or non-commissioned officers in the case of battalions, if officers are not available) with the corresponding brigade or battalion on either flank. It must be remembered, however, that advanced brigade and battalion headquarters are usually small, and that every additional person is a tax on the accommodation.

When good communications exist between divisions, the exchange of liaison officers is, as a general rule, unnecessary, nor will it normally be necessary for divisions to have permanent liaison officers with their own brigades.

Section 13.—Intelligence.

The first duty of the intelligence branch after the attack has been launched is to provide the commander of the attacking force with prompt information with regard to the dispositions, movements and intentions of the enemy. This information will be obtained mainly from prisoners and captured documents and maps. The divisional intelligence officer should be in close touch, therefore, with brigade intelligence officers and should keep moving forward as the advance continues to positions where he will be able to interview prisoners, to report identifications and to obtain prompt information on matters of immediate tactical importance. It is essential that this officer should be able to obtain direct telephonic communication with divisional headquarters.

The value of speed in obtaining identifications and information from prisoners cannot be sufficiently emphasized. Arrangements must, therefore, be minutely worked out beforehand with the infantry and with the provost branch to ensure that prisoners are sent back quickly, and that the arrangements for searching them, for the separation of officers and non-commissioned officers from the men, and for the prevention of the destruction or abstraction of documents are thoroughly understood and obeyed.

Intelligence personnel, when available, should be especially detailed to search the dead on the battlefield, hostile headquarters and telephone exchanges, etc., and arrangements should be made to send direct to corps headquarters any documents or maps which they may discover.

The second duty of the intelligence branch is to supply the commander with information as to the progress of the attack. It serves as an independent and supplementary channel of information which may prove of great value. Every effort must be made, therefore, to obtain observation on the battlefield, and to perfect all possible means of communication. This necessitates the establishment of successive observation stations during the course of the battle, and implies a thorough knowledge of the ground by the corps and divisional observation sections and groups. As the advance proceeds, groups of observers, amongst whom there should be signallers and runners, must move forward to previously selected observation stations from which the successive stages of the battle can be observed. The greatest care must be taken to arrange beforehand the communications during an advance, and, as soon as a new observation station has been established, liaison between it and the nearest headquarters should be arranged.

(For more detailed information with regard to the work of the intelligence branch during a battle, see Appendix (D)).

Section 14.—Signal Communications.

(See also S.S. 141, 191, 207 and 211.)

During the attack, communication within the brigade and from the brigade to the division, to the brigades on the flanks, and to the artillery must be maintained.

As the advance proceeds, the division will continually push forward its report centre as far as possible on the general alignment of the headquarters of brigades, to which it should be connected by telephone and alternative means of communication. All orders and reports will be sent to this report centre. It is essential, therefore, that all information with regard to the

successive changes of brigade and battalion headquarters should be notified immediately to this report centre. Telephonic or telegraphic communication between brigade and battalion headquarters should be established whenever the advance comes to a standstill.

It will be impossible, at any rate during the early stages of the advance, to depend upon telephonic or telegraphic communication in the forward fighting zone, the transmission of information will, therefore, depend principally upon wireless, visual signalling, liaison officers, mounted orderlies, cyclists, relays of runners, messenger dogs and pigeons.

Communication between battalions, between brigades in the line and between brigades and the divisional report centre, will be maintained by means of wireless, visual signalling and mounted orderlies.

Communication with the artillery will be carried out through artillery liaison officers and F.O.O.s.

Communication between the artillery accompanying the infantry and the infantry to which it is attached must be arranged between the commanders concerned. It is the duty of the artillery to provide and to maintain this communication.

Communication between the infantry and the R.A.F. will be carried out by means of pre-arranged signals and the Popham (T) panel. Communication between the R.A.F. and tanks and cavalry will be carried out by means of prearranged signals. (For detailed information with regard to communication between the R.A.F. and the infantry and tanks, see Appendices (B) and (C).)

Section 15.—Position of Commanders and Movements of Headquarters.

It is of great importance that the battle headquarters of the division and brigades should be established as far forward as possible from the beginning of the battle and that they should be moved forward by bounds in order to keep pace with the advance of the attacking troops. In order to simplify communications, the possibility of grouping headquarters should always be borne in mind, and the close proximity of infantry brigade and artillery group headquarters should be insisted upon.

In the battle commanders must have their headquarters in the vicinity of their reserves in order that they may be in touch with the situation, and able, if necessary, personally to intervene in the conduct of the fight. Brigade commanders should, therefore, select positions from which they can see the ground, and arrangements should be made to enable them to move forward, as the attack progresses, to a new position from which observation can be obtained.

Subject to the above considerations, commanders should retain their headquarters as long as possible, otherwise communications may fail and the direction of operations become impossible. When any commander is about to move his headquarters, he must inform all concerned, including commanders of troops on either flank, of the location of his new headquarters. Similarly, when a commander has arrived at his new headquarters, he must inform all concerned. Failure to do this means the miscarriage of orders, delays, etc., and may lead to the failure of an operation.

If a commander finds it necessary to be absent from his headquarters, he must leave full information as to where he is going, and what routes he proposes to follow; in order that urgent messages may reach him.

During his absence he must leave in charge a responsible officer, who must know his intentions, so as to be able to deal with the situation as it develops.

All headquarters must be indicated by distinctive flags by day and by lamps at night.

Section 16.—Duties of Engineers and Pioneers.

In order to expedite the forward movement of guns, ammunition and transport, it is of the utmost importance that roads and tracks within the enemy's lines should be made passable for traffic with as little delay as possible. Detachments of engineers and pioneers must, therefore, be detailed to go forward soon after the infantry has captured the enemy's first defensive system in order to bridge trenches, to fill in shell holes and to construct tracks. They should also be made responsible for the early erection of adequate signboards. The work which will be required in this connection can be determined approximately by previous reconnaissance of the ground and by the study of maps, aeroplane photographs and models. Definite tasks should be allotted to each detachment. The remainder of the available engineers and pioneers should be retained under the direction of the C.R.E. and will be employed to carry out the various tasks to which reference is made in Appendix (E).

Section 17.—Medical Arrangements.

In order to ensure the quick and efficient evacuation of the wounded, it is essential that the A.D.M.S. should work in close touch with the general staff.

Regimental aid posts and field ambulances must follow closely the advance. The positions to which they are to be moved during the initial stages of the advance should be selected beforehand. Such positions should be clearly marked, and should be near the main traffic route. No transport of any description should go back unloaded so long as there are wounded to be conveyed to the rear. Medical officers must do their utmost to keep in touch with the units to which they belong, and must inform their commanding officers of the positions of the regimental aid posts. Any change in the position of a regimental aid post should also be made known to the bearer division of the field ambulance which is working up to it. Regimental bearers should not be employed to bring wounded farther back than to the regimental aid post. As the advance proceeds, the wounded should be collected in groups under the best cover that can be found, and carried back to the aid posts by bearers detailed for the purpose. Places where the wounded are collected should be indicated by means of flags, a sufficient number of which should be given to the regimental bearers.

The advanced dressing station should be placed in a position where it will be practicable to clear it quickly by means of tramways, light railways, motor ambulances or returning empty lorries. It should be in telephonic connection with divisional headquarters, in order that the A.D.M.S. may be kept constantly informed as to the progress in the evacuation of the wounded. (For more detailed information with regard to medical arrangements, see Appendix (N).)

Section 18.—Movement of Transport.

Arrangements must be made for the supply of ammunition for the infantry, artillery, machine guns and trench mortars, and for moving forward the various echelons of horse transport, pack animals, etc., behind the attacking troops. The supply of food and water must also be ensured; cooks and first line transport must, therefore, be organized to follow the advance. Regimental transport officers must keep in touch with their battalions, and every effort must be made to get forward rations, including rum and water, without unnecessary delay.

Appendix A.

ARTILLERY IN ATTACK.

Preliminary Bombardments.

(i.) **Plan.*—If it is decided (in accordance with the principles mentioned in Part II., Chapter 4, Section 2) that the attack ought to be preceded by a preliminary bombardment, the plan for this bombardment is prepared by the G.O.C., R.A., corps, in conjunction with the general staff, under the orders of the corps commander and after consultation with the divisional commanders. It provides for the employment of all the artillery resources of the corps, the co-operation of the artillery of corps on either flank being co-ordinated by the G.O.C., R.A., army, under the orders of the army commander.

The general staff of a formation is responsible for all the work of co-ordination between the infantry and artillery plans. It is its duty to see that the artillery plan is understood by the commanders of the attacking troops, and that the views of those commanders regarding it are expressed, and, so far as they are approved, incorporated in the plan.

It is the duty of the senior general staff officer of a formation to see that the artillery plan meets the commander's requirements in every respect.

(ii.) *Destruction of enemy trenches and works.*—The ground, which is to be attacked, and also maps and aeroplane photographs, are thoroughly studied before the day fixed for the infantry attack. Every point whence the enemy might bring rifle and machine-gun fire to bear upon the ground between the jumping-off line and the objective is either demolished or noted for subsequent treatment.

The extent to which the enemy's trenches and works should be destroyed is a matter for serious consideration.

To reduce the whole terrain to crater condition creates a formidable obstacle to the advance of the infantry and to the subsequent advances of the transport. It also offers to the enemy opportunity to organize his machine-gun defence in the very way that is most troublesome to deal with.

Again, the complete demolition of prepared defences can in many cases only be effected by a bombardment of such duration that it sacrifices the factor of surprise and presents the enemy with time in which to collect his reserves, and to make the dispositions required for meeting the attack.

Groups or brigades of heavy and siege artillery are detailed to carry out the work of destruction on the front of each division. It is desirable that the artillery formations concerned should be placed under the command of one man ("Double Group Commander") who should live close to divisional headquarters or be in direct telephonic communication with the division. Alternatively, a senior R.G.A. liaison officer should be attached to the division. By either means the divisional commander is able to point out the amount and nature of destruction that he wishes carried out. Divisional commanders' wishes are thus conveyed to the brigadier-general, commanding corps heavy artillery, who co-ordinates the various bombardment programmes and authorizes their execution in accordance with such instructions as he may have received from the G.O.C., R.A., corps.

*N.B.—The general control and direction of the artillery operations rests with the army commander who may direct the G.O.C., R.A., army, to issue detailed instructions to artillery formations.

If special conditions render it necessary for the duration of a bombardment to extend over a day, photographs, shewing the progress of the work of demolition, should be taken daily when conditions are favourable, and issued to all divisional commanders concerned as well as to the corps commander; divisional commanders must satisfy themselves that all danger points in their zones are adequately dealt with, and they should bring to the notice of the corps commander any points, which in their opinion, require more treatment before the infantry start.

(iii.) *Wire cutting.*—This is carried out in each divisional zone by the field and heavy artillery allotted to that zone. Any assistance required from outside should be arranged by the corps. 6" mortars, field artillery and medium and heavy howitzers, employing instantaneous fuzes, can be employed against wire. In principle, as much of the enemy's front system as possible should be dealt with by trench mortars, thus releasing field and siege artillery for other tasks.

Wire cutting demands the closest co-operation between the artillery and infantry. If the wire-cutting extends over a day, commanders of assaulting battalions should decide by personal observation and by means of patrols when they consider that the wire on their fronts has been properly cut and inform the artillery commanders concerned.

Once gaps have been made, it is the duty of divisional commanders to employ all means at their disposal to keep these gaps open during the hours of darkness throughout the period of the preparatory bombardment. These means include the use of rifle and machine gun fire, rifle grenades, etc. Much artillery ammunition can thus be saved and so can be used for strengthening the fire on communication trenches and other approaches.

(iv.) *Inflicting casualties on the enemy, etc.*—The artillery will also aim at causing the enemy loss, other than that involved by destructive fire against defences, by harassing fire on his communications and rest billets.

Effective harassing fire will depend very largely on close co-operation between artillery reconnaissance officers and divisional intelligence officers. The general staff is responsible for seeing that this work is so thoroughly co-ordinated that information from all sources is correlated, checked, and used promptly and to the best effect.

(v.) *Counter-battery work.*—Destructive fire against the enemy's batteries must be carried on both before and throughout the battle. During the period immediately preceding the attack, however, there should, as a general rule, be no unusual activity in counter-battery work or the enemy may be put on his guard. The positions of all known hostile batteries, therefore, must be carefully recorded, in order that they may be subjected to a violent neutralization fire at the moment of assault, and at the same time all the enemy's observation stations, which are known, should be engaged.

Barrages.

(i.) *Object.*—The object of the barrage is to prevent the enemy from manning his defences and installing his machine guns in time to arrest the advance of the assaulting infantry. The barrage must be sufficiently heavy, therefore, to keep the enemy in his dug-outs, and sufficiently accurate to allow the infantry to get so close to the points to be attacked that it can cross the remaining distance before the enemy is able to man his defences. The barrage should be organized in depth to ensure, so far as possible, the protection of the infantry from effective rifle and machine gun fire. What the depth of each actual barrage may be, depends primarily on the artillery resources available, the configuration of the ground and the enemy's dispositions for defence. The enemy's machine gun fire may prove dangerous at ranges up to 2,500 yards from the attacking infantry.

(ii.) *Organization.*—In accordance with the foregoing principles, the barrage is organized in several belts of fire, the belt nearest to the advancing infantry being composed of the fire of the major portion of the 18-pdr. guns and generally known as the "creeping barrage."

The 4.5" howitzers and the remainder of the 18-pdrs. form a barrage in advance of the "creeping barrage"; their fire, while dwelling on strong points, and working up communication trenches, is at the same time organized in depth.

Beyond this again, a further belt of fire is formed by medium and heavy howitzers and a proportion of the 60-pdrs. Their fire is directed so as to search all ground which commands the line of advance of the infantry or from which it is possible that indirect machine gun fire might be brought to bear through the creeping barrage. Especial attention must be paid to localities from which flanking fire can be brought to bear on the front of attack.

All these barrages roll back according to a time table, the main principle being that there should always be a searching fire up to 2,000-2,500 yards in front of the advancing infantry. The fire, other than that of the "creeping barrage" should not follow as even cadence, or lift in regular lines. It should be so handled that the enemy's machine gunners may be unable to realize when the lift has taken place.

Finally, from the beginning of the barrage, the fire of long-range guns of all natures should be used against the probable approaches of troops which may be brought up for the purpose of counter attack.

(iii.) *The Creeping Barrage.*—In the first assault, the "creeping barrage" opens and dwells a few minutes on the enemy's foremost position. If the opposing lines are so close that this cannot be done without endangering the attacking troops, or if the position of our own front line is uncertain, it is advisable to withdraw the troops slightly before they form up for the assault in order that there may be no danger of opening fire beyond any locality which the enemy may occupy with advanced machine guns.

In an attack on an entrenched system the barrage does not as a rule lift direct from one trench to another, but creeps slowly forward, sweeping all the intervening ground in order to deal with any machine guns or riflemen pushed out into shell-holes in front of, or behind, the trenches. This creeping barrage will dwell for a certain time on each definite trench line to be assaulted.

From both an artillery and an infantry point of view simplicity in the organization of the barrage is desirable; curves and irregularities must be avoided as far as possible. The advance of the infantry will be much facilitated if the creeping barrage is moved forward in a straight line parallel to the line of departure of the assault.

The barrage should be arranged so as to help any change of direction which the troops may have to make. Direction is a matter of particular importance. Troops are trained to keep up to the barrage and can only do so by conforming to its shape. Curves and irregularities in the barrage are, therefore, always apt to cause a loss of direction.

(iv.) *Pace of the Creeping Barrage.*—(a) The pace of the barrage is governed by the pace decided on for the infantry advance. The pace decided on for the infantry advance is dependent on local conditions, and it is impossible, therefore, to lay down as a general rule any definite rate of movement for the barrage, the pace of which will, with rare exceptions, be identical with that decided on for the infantry.

In estimating the correct rate of advance, the following factors should be carefully weighed:—

First—The probable resistance of the enemy, depending on the moral, quality and number of his troops, the nature of his dispositions and the strength of his defences.

Secondly—The state of ground and weather. The extent to which the ground has been cut up by shell fire, the presence or absence of mud, wet or dry weather conditions, and the existence of woods, houses, villages and streams in the line of advance, all affect the pace at which the infantry can move.

Over good ground, and in the absence of serious opposition, infantry can advance at a rate varying according to the depth of the advance, between 50 and 100 yards a minute.

Thirdly—The length of the advance. A uniform pace for the barrage throughout the advance is, as a rule, unsound; the general principle should be for it to move more quickly at the start and to reduce its pace during the later stages, in order to allow the infantry time to reorganize.

In the case of a long advance, the attacking troops should be afforded the opportunity of recovering their places close up to the barrage by means of short pauses between the different objectives; the barrage should also be kept on each objective for an increased period in order to ensure that the attacking troops are closed up and ready to rush to the assault immediately the lift takes place.

Fourthly—The moral effect on the attacking troops. A slow advance checks, a rapid advance stimulates the keenness of the attacking troops.

(b) If the pace decided on is too rapid, the whole advantage of the barrage will be lost, since the attacking infantry will fail to keep up with it and the enemy will be given time to man his defences before he is attacked. As a result, the advance may be brought to a standstill in close range of the enemy's rifle and machine gun fire, while the barrage will continue to move on in accordance with the time table.

If, on the other hand, the pace decided on is too slow, the rear portions of the attacking force will tend to push on too fast and will become mingled with the leading portions, thereby forming a denser line and incurring heavier casualties, and also losing the momentum of the attack. Further, the enemy will be given time in which to withdraw his guns and infantry, and to reorganize his defence.

Finally, it must be remembered that the slower the rate of advance the greater will be the amount of ammunition expended in the barrage. This is an important factor for consideration in cases where the rapidity of the general advance may have rendered ammunition supply a matter of difficulty.

(v.) *Barrage Tables (or Maps).*—The arrangements for the barrage are made, as part of the corps artillery plan, by the corps commander after consultation with divisional commanders, particular attention being paid to the points of junction between divisions to ensure that the barrages on each divisional front overlap properly.

Lifts and timings worked out are then embodied in a time table or map and issued to all concerned, the corps being responsible that these maps or tables are issued in sufficient time to enable the artillery to carry out the necessary arrangements (see paragraph (x.) below).

When the barrage maps or tables have been approved and issued by the Corps, no alterations by subordinate commanders are allowed, unless there is a change in the general plan of attack.

(vi.) *Protective Barrages.*—The object of a protective barrage is to cover the consolidation of an objective and the reorganization of the attacking troops by protecting them from local counter-attacks. To this end, the protective barrage should be delivered in depth. That portion of this barrage which is nearest to the troops should remain stationary and must be of such volume or so thickened by smoke shell as to leave no possible doubt as to its existence and position. The remainder of the barrage, however, must search and sweep with the objects laid down above. The area of the ground thus searched should extend to a depth of at least 2,000 yards.

(vii.) *Smoke Barrages.*—Smoke barrages may be used with effect to blind hostile machine guns and anti tank guns, and thereby to prevent aimed fire from being directed against the advancing infantry or tanks until they are at close quarters with the enemy. For this purpose both these arms should be practised in advancing through smoke without losing direction.

The use of smoke, however, must be carefully considered, and must depend to some extent upon the weather conditions, for, if there is a thick ground mist in addition to the smoke, the drivers of tanks may sometimes find difficulty in avoiding obstacles, especially over ground where there are many trenches.

Smoke may also be used to conceal the zone of main operations from the enemy's observation; to deceive him as to the real points of attack; to hide the advance of reserves; and to protect advancing troops from enfilading fire by screening their flanks.

In no case must the barrage interfere with the exploitation of success. Where the objectives are deep, it should only be used during the halts which take place as intermediate objectives are reached in order to give time for the arrival of reserves.

(viii.) *S.O.S. Calls.*—The S.O.S. call must only be used to ask for artillery support with the definite object of assisting the infantry to repel a counter-attack. This call must never be employed except in the case of imminent attack by the enemy.

Infantry must be trained to understand that to evoke all-round fire by means of a S.O.S. call, unless genuinely warranted, not only puts a severe strain upon the artillery, but is also calculated to bring about in course of time a loss of that quickness and accuracy of fire which can alone help the infantry at critical moments.

(ix.) *Control of the Barrage.*—(a) It is the duty of the army commander to ensure the co-ordination of the barrages of his several corps, and the corps commander is responsible for the general co-ordination and arrangement of his own barrages after consultation with the divisional commanders.

The control of the barrage remains in the hands of the corps commander throughout the assault, but, in order that divisional commanders may be able to deal promptly with any situation which may arise on their fronts, they will be given a call on a certain number of batteries (18 pdrs., 4.5" and possibly 6" howitzers), from the time when the assault begins.

All batteries thus detailed to assist a division will have tasks allotted to them in accordance with corps orders and will carry them out, unless and until their assistance is demanded by the divisional commander concerned.

The assistance of any heavy or siege batteries placed at the divisional commander's call will be demanded through the commander of the heavy artillery directly supporting the division's attack or through the R.G.A. liaison officer, as the case may be.

(b) To enable commanders of assaulting brigades to take immediate action in any situation which may arise, the divisional commander may delegate to brigadiers the power to call direct on some of the batteries placed at his disposal.

The brigadier will call on these batteries through the commander of the field artillery directly supporting his brigade. This commander will, whenever possible, establish his headquarters in the immediate vicinity of the infantry brigade headquarters, but, where this is not possible, he will maintain the closest touch with the infantry brigadier by means of a senior artillery liaison officer.

The governing factor as to which of these two methods should be followed is to a great extent a question of communications. The artillery group commander must be so placed that he can keep control of his batteries and be in touch with the C.R.A. of his division. If the position of the infantry brigade headquarters is such that these communications have a reasonable prospect of remaining open, the artillery group headquarters should be in the same place. If not, the artillery should be represented by a responsible liaison officer.

(x.) *Issue of Orders.*—An effective artillery barrage is only possible if the tasks assigned to the batteries which are to take part in it reach them in sufficient time to enable them to make all the preliminary arrangements required. These arrangements include:—

(a) The supply of any additional ammunition required at the battery positions.

(b) The working out of barrage tables for individual guns, including the various angles, angles of sight, elevations, and rates of fire required in each case at different lifts in the barrage.

(c) The setting of fuzes, and the arrangement of ammunition by lifts.

In order that these preparations may be made, it is essential that the orders should reach batteries during daylight and at least 12 hours before zero.

3 Signals from Infantry to Artillery.

(i.) For the first hour or so after the assault, until communications can be well established, touch between the infantry and its supporting artillery will generally be restricted to various methods of indicating the position of the leading troops. Light signals are useful for this purpose and infantry commanders, therefore, must ensure that their leading troops are equipped with an ample supply of these rockets before the assault.

(ii.) Coloured flags, carried by one or two men in each platoon, can be used to indicate to the artillery the line gained by the leading infantry.

These flags must not be stuck in the ground and will mean nothing unless they are waved; the poles should be short and blunted at the end.

A combination of black and yellow on a flag about 18 inches square is the easiest to observe.

(iii.) The position of the leading infantry has been successfully indicated to aeroplane observers (and so transmitted to the artillery) by the lighting of flares and flashing of discs at certain prearranged times or at an agreed signal from the aeroplane.

None of the above methods, however, can be regarded as a certain indication of the whereabouts of the leading troops, and consequently every effort must be made to re-establish communication from front to rear on normal lines.

4. The Artillery Advance.

(i.) The amount of artillery called upon to advance early will vary with the depth of the objective, the degree of success attained, and the facilities for forward movement and ammunition supply. Arrangements must, however, be made beforehand for the eventual movement of all the artillery.

(ii.) The order in which batteries of different natures will move is dependent on the original plan.

If a limited advance only is to be made with a view to further operations, guns must be moved with the following objects in view:—

(a) To deal with the enemy's guns;

(b) To build up the framework of artillery which is to cover the next assault;

(c) To protect the consolidation of the infantry position.

(iii.) If an immediate "break through" is intended, the capture of the enemy's organized defences will introduce the conditions of open warfare, and the artillery's tactics must be modified accordingly.

Field and heavy artillery will be detailed beforehand to move forward with the infantry. Where these guns are also employed to fire in the barrage, the hour at which they will move forward must be laid down in orders, and also the hour at which they will come under the orders of subordinate commanders.

Command of the field artillery must in this case be decentralized so that subordinate infantry commanders may have at their disposal a sufficient force of artillery to deal at short notice with local opposition and to give close support to their advance.

This will be effected by grouping definite units of the artillery which is to go forward with the units of infantry which are carrying out the advance.

The organization of these groups is the duty of the divisional commander in consultation with his C.R.A. The degree of decentralization must depend upon circumstances. Normally, a brigade of infantry should have a field artillery brigade attached to it, the combined force being commanded by the infantry brigadier. When infantry and artillery units are thus grouped, the artillery commander must be in the closest touch with the headquarters of the formation with which he is acting. The more the two commanders can be together the better, but the artillery commander must always be able to exercise effective control over his guns.

It may be necessary in close country and for definite purposes, such as the attack of local centres of resistance, to decentralize further and to attach batteries or sections to battalions. In principle, however, it is a mistake to break up artillery units, and, although under certain circumstances it may be necessary to use a single gun, the gun should belong to a forward section and should not be detached as a separate unit.

(iv.) A section is a suitable unit to act in close support of a battalion, but, in cases where a battalion is operating on a wide front, it may be necessary to group a battery with it. The battery must then act with its sections dispersed, the sections being grouped, if necessary, with companies.

(v.) The battalion commander must keep the artillery informed of the situation of his leading troops by any means at his disposal. The artillery commander should not be dependent upon what he can find out for himself, though he should take every step to keep in touch with the situation. It is the essence of liaison that its maintenance is the duty of both parties concerned

(vi.) An O.P. from which the progress of the advance can be clearly seen offers the best solution of the problem of how, when and where to apply fire to advantage and of obtaining constant and early information of the situation.

Battalion commanders should be accustomed to choose their headquarters in the vicinity of this O.P. and at every subsequent advance should be prepared to move forward from O.P. to O.P. Within certain limits, the position of these O.P.'s can be determined beforehand from the map.

(vii.) Guns advancing in close support must not absolutely limit their action to the support of particular units; the most troublesome machine gun fire often comes from a flank opposite the front of some other formation. If opportunity offers, therefore, the artillery commander should definitely locate target, even though it may not be giving trouble to the particular troops whom he is supporting.

In this connection, advanced guns must be prepared to engage any hostile guns which impede the advance of tanks. This duty of protecting tanks forms one of their most important functions.

A section of 18-pdrs. acting in close support of advancing infantry carries with it 176 rounds of ammunition per gun; expenditure, therefore, cannot be on the lavish scale which is customary in trench warfare, and anything in the nature of a barrage is out of the question; the guns should be used as weapons of opportunity.

(viii.) Isolated machine gun nests, when located, are best engaged by single guns of forward sections, run up for the purpose. (See paragraph (iv.) above). Gun detachments should be trained to man-handle these single guns over rough ground.

Should the enemy's position not be definitely located, or the existence of several machine gun nests be thought probable (as, for instance, behind hedges, in houses, etc.), a definite area, not a fixed point, should be engaged with section fire.

(ix.) In operations of this nature, the security of the leading artillery units is a matter for consideration. Measures should be taken to protect the guns from local counter-attacks, which are to be expected.

Battery commanders should place their Lewis guns so as to protect their front and flanks, without separating them too widely from the battery, and must issue clear orders as to their functions. When necessary, infantry escorts must be asked for and provided.

(x.) When available, mobile medium mortars will be pushed forward in close support of battalions, and will be handled on the same principles as sections of 18 pdrs. Every advantage must be taken of their high angle fire to obtain as much cover from view as possible, as their short range will necessitate their coming into action well forward.

(xi.) The command of any heavy artillery allotted to a division will be exercised by the divisional commander through his C.R.A.

(xii.) *Long-range Fire.*—When the enemy is retiring, the range of heavy guns and of long-range heavy howitzers must be exploited to the utmost, fire being concentrated on vital points such as bridges and cross-roads in the enemy's line of retirement in order to disorganize and destroy his retreating artillery and transport.

(xiii.) *Ammunition Supply.*—Once the artillery moves forward, it is important that no more ammunition is fired than is absolutely necessary to deal with the enemy's resistance, on account of the difficulty of getting it forward. As long as the resistance of the enemy is limited to rearguard action, excessive ammunition expenditure by either field or heavy artillery

in unobserved fire is unnecessary and unjustifiable. Harassing fire is of little value when the enemy is retiring unless it interferes with the movements of his main body.

In no circumstances whatever should more guns be sent forward than can be supplied with sufficient ammunition.

5 Resting Artillery.

The general staff is responsible that every possible arrangement is made for resting the personnel of batteries. Much fatigue can be saved by supplying labour to assist batteries which arrive just before operations in the construction of positions and to bring up ammunition. During the intervals between successive stages of operations, the detachments of sections or batteries should be withdrawn. No more guns should be manned than are really necessary for the defence of the line held at the moment.

Appendix B.

CO-OPERATION BETWEEN AIRCRAFT AND INFANTRY.

Section 1.

1. **Nature of Co-operation.**—Aircraft are especially detailed to co-operate with infantry for two purposes:—

- (i.) Contact patrol.
- (ii.) Counter-attack patrol.

2. **Contact Patrol Duties.**—Contact patrols supplement, but in no way take the place of, other systems of communication.

The duties of the contact patrol observer are:—

- (i.) To locate the position of our own troops.
- (ii.) To transmit this information as rapidly as possible to the headquarters of the formation concerned.
- (iii.) To transmit messages from brigade and battalion headquarters to the headquarters of their formation.

Observers must be fully informed as to the plan of attack, the disposition of the troops with whom they are working, and their objectives. Before going up, the observer should always, if possible, visit the division, or, if the operation is a small one, the brigade concerned, in order to obtain all the detailed information possible. He should synchronize his watch with the staff, so that he may know exactly when to look for the beginning of the attack. As much notice as possible should be given to the squadron concerned when a contact patrol is required, in order that the observer may have time to make these visits. The contact patrol aeroplane should not appear previous to the assault, in order not to attract the enemy's attention prematurely to the time and place of assault.

A contact patrol observer must have engraved firmly on his mind, by means of a careful study of the ground and of maps and aeroplane photographs, every detail of our own and the enemy's sector to such an extent that it is not necessary for him to look at his map when in the air. Corps and divisional intelligence summaries must be carefully studied.

3. **Recognition of Contact Patrol Aeroplanes.**—Aeroplanes detailed for special contact work must have special markings, which should be known to all ranks of the infantry with which they are working. Suitable markings are:—

(i.) Pieces of 3-ply wood painted black about 12" x 18" attached by hinges to the trailing edge of each lower plane about 8 feet from the fuselage.

(ii.) A long narrow wind vane attached to the rudder.

Contact patrol aeroplanes will, in addition, carry a Klaxon horn and signal lights for the purpose of making themselves known. The Klaxon horn is also used to answer signals received from the ground. The infantry may, as a general rule, expect to see its contact patrol machine slightly in rear of its own trenches.

4. **Methods of Communication between Infantry and Aeroplanes.**—Contact patrol aeroplanes receive signals from:—

- Attacking infantry.
- Battalion and brigade headquarters.

(A). The attacking infantry signals to the aeroplane by means of flares, white cloth flaps moved about or tin discs 4" to 6" in diameter flashed in the sun. The disc is a much easier signal for the observer on a sunny day. Flares will be lit, flaps moved or discs flashed:—

- (i.) By previous arrangement.
(a) At specified times.
(b) At specified places.

(b) As specified places.

The former is, as a rule, the preferable plan, but it is not always possible to warn the infantry beforehand that the contact patrol aeroplane will appear at a particular time. An attempt to do so should, however, always be made, especially if the infantry is not thoroughly used to working with an aeroplane. It should be remembered that it takes considerable time for the information to reach the front line.

The approximate hours at which flares will be lit, flaps moved or discharged should be laid down in orders. At these hours the attacking troops must be on the look out and must light their flares, move their flaps or flash their discs when their aeroplane calls for them by Flaxon horn and smoke signal. (See para. 5.) About half an hour after the objective is expected to be reached has been found a suitable time for signalling.

- (ii.) Without previous arrangement.

(a) When called for by the aeroplane by Klaxon horn and smoke signal (see para. 5).

(b) On the initiative of local commanders, who may wish to make their position known. Signals should only be given by the order of local commanders when the aeroplane working with their formation is flying in their vicinity.

Flares should be lit in groups of three about every 30 yards, as ordered or when called for by the aeroplane observer. Flares should only be lit by order of an officer or non-commissioned officer.

Flares can be seen if lit at the bottom of trenches or in shell holes, but care must be taken that there is no obstruction between the flare and the aeroplane.

If the troops are using flares and cannot light them at once, they should wait for a repetition of the signal before doing so; otherwise, flares may be lit when the observer is not in a position to see them.

Discs must be flashed as ordered, or when called for by the aeroplane observer. Each man must be provided with a disc, which may be fixed to the inside of a flap attached to the gas respirator haversack. If, in addition, the flap is painted white inside or is of white American cloth, it will attract the aeroplane observer's attention when held open and moved about, even on a dull day.

Flares, flaps and discs are acknowledged by the aeroplane by the signal RD sent on the Klaxon horn.

When signals are called for by the aeroplane, it is important that they should be given by the most advanced troops.

As long as the battle is not definitely decided, the observer must endeavour to ascertain the position of our own front line, even if the infantry does not display signals. The fall of the enemy's artillery fire (for instance, the gradual lifting of the enemy's barrage and, during a hostile attack, its lateral limits) may give him a fair indication of the position of our front line. Care must be exercised, however, when making reports of this nature, as the fall of the artillery fire at critical periods of the battle does not always correspond to the

tactical situation. In such cases, the observer can only make sure of recognizing our own infantry by flying at a sufficiently low altitude to observe it with the naked eye.

(B). Battalion headquarters indicate their position and identity to the aeroplane by means of the T signalling panel and the ground trip.

The brigade commander indicates the position of his headquarters and his identity to the aeroplane by means of a ground signal sheet and strips laid alongside.

The ground sheet or "T" panel, as the case may be, laid on the ground at the headquarters concerned indicates its position, while its identity is disclosed by a two-letter code call formed by ground signal strips. This two-letter code call will be issued by G.H.Q., and will be changed periodically. Battalions will use the same call letters as their brigades, and will be identified by the position in which the call letters are placed with reference to the "T" panel, thus :—

No. 1 Battalion will place its call letters on the left of the "T"

No. 2 " " " " " " " " top " "

No. 3	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
No. 3	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100

Example:—



The example represents No. 3 battalion of the brigade having the call letters AX.

Sheets, or panel, and strips must be placed in position as soon as the headquarters is established, but should be kept covered over when not in use, in order to avoid disclosing the position of headquarters to the enemy.

Battalion and brigade headquarters send messages to the aeroplane by means of the "T" panel, using a figure code. For decryption and use of panel and for code see Sections 2 and 3. Ground signal flags will not be used for the purpose of sending messages.

Complicated systems of communication are bound to break down in battle, and signals sent by the above means will therefore be confined to those given in Section 3.

Ground signal sheets, strips or panels must be carefully sited in order to give the aeroplane observer a dark background, if possible.

It is essential that the observer in the aeroplane should have a clear all round view. Unless careful judgment is exercised, efforts to conceal the panel or ground signs from possible observation by the enemy may increase the aeroplane observer's difficulties, and so delay the reading of the message.

In signalling to an aeroplane from the ground, it is essential that :—

(i.) Signallers should know when the aeroplane is in a position to receive, and when it is not. The most suitable time to send messages is when the aeroplane is overhead or flying away from the ground station, but care must be taken that the view is not obstructed by men standing in the line of vision. When approaching the ground station, the observer's view is obstructed by wings and fuselage.

(ii.) Signallers on the ground should have patience, and continue sending until their signals are acknowledged.

They must realize that the observer may have messages to read from several stations.

5. Methods of Communication between Aeroplanes and Infantry.—Contact patrol aeroplanes call for signals from attacking infantry by means of:—

(i.) A special smoke signal bursting into 14 trails of smoke, 7 yellow and 7 purple.*

(ii.) A succession of "A's" on the Klaxon horn.


The lighting of flares, the moving of flaps or the flashing of discs must be acknowledged by RD on the Klaxon horn, in order that the infantry may know that their signals have been received.


Messages from headquarters of brigades and battalions are answered by the aeroplane by means of the Klaxon horn (see Section 2). Messages can also be dropped to these headquarters.

6. Methods of Communication between Aeroplanes and Headquarters of Corps and Divisions.—Aeroplanes communicate with the headquarters of corps and divisions by dropping message bags.

Observers should be provided with tracings on a suitable scale and shewing all known trenches, on which the positions reached by our own troops will be marked as follows:—

Flares

Battalion H. Q.  (Panel) with call letters in their appropriate position.

Brigade H. Q.  with brigade call letters.

When necessary, the tracings should be supplemented by a message. On reaching the ground, the observer will report personally or by telephone to the headquarters concerned.

Personal discussions between the observer after landing and the staff which issued the instructions, or the individual infantry commanders, will clear up doubtful points. The observer can, at the same time, receive fresh instructions. The provision of an intermediate landing ground close to corps and, if possible, divisional advanced headquarters is therefore advisable.

7. Training in Contact Patrol Work.—All commanders must take steps to ensure the thorough training of infantry and observers in contact patrol work. This training must be continually carried out in units which have been withdrawn for rest and training.

Training must be carried out in accordance with the above instructions. Unauthorized alterations are forbidden, as they lead to misunderstandings and may lead to heavy casualties. Every officer, non-commissioned officer or man must be acquainted with the regulations to such an extent as to give him a working knowledge of the subject, and to enable him to act on his own initiative. Signal personnel should receive special additional training.

The importance of the contact patrol aeroplane will only be fully realized during a battle, and infantry observers must, therefore, be trained under conditions approaching as closely as possible to those obtaining during a battle (absence of all telephone lines and ground observers).

* Pending the provision of this signal a white Very light will be used.

When an attack has been successful, the troops are not too much exhausted and the hostile shelling is not too heavy, contact patrol work carried out by practised troops and a practised observer is simple. When the reverse is the case, it becomes so difficult that only the highest degree of skill and discipline, combined with constant previous practice and the fullest understanding between observer and infantry, can achieve successful results.

8. Counter-attack Patrol Duties.—The duties of the counter-attack patrol observer are:—

(i.) To report on the enemy's dispositions and defences.

(ii.) To locate the position of the enemy's front line and to watch for movements of reserves, massing of troops for counter-attack, minenwerfer, machine-guns and strong points holding up our advance and targets of such nature.

(iii.) To call for concentrated fire (LL call) or barrage fire (S.O.S. call) when required by the situation. (See S.S. 131, paragraph 28 (ii.) (b) and (c).)

9. Employment prior to a Battle.—The employment of the counter-attack patrol prior to a battle will depend on the situation. If the strength of the hostile artillery fire leads to the conclusion that an attack is contemplated, and that the infantry assault will soon be delivered, the enemy's trenches will have to be watched all day long. As the enemy will, for the most part, make use of the hours of darkness to bring up and assemble his assaulting troops, observation of the battlefield must begin before dawn during critical periods. The observer must start, therefore, while it is still dark, so as to be over the enemy with the first streak of daylight.

Prior to an attack by our own troops, the counter-attack patrol may be suitably employed on reconnaissance of the enemy's trenches, with a view to discovering, as far as possible, his dispositions and of keeping the command constantly informed as to the state of his defences and results of our artillery fire.

10. Employment during a Battle.—During a battle the whole duty of the counter attack patrol observer is to keep the command informed concerning the position and movements of the hostile forces, excluding artillery in action. (See para. 8 (ii.) and (iii.) above.) Thus a body of artillery on the move might be reported by the counter-attack patrol observer by the LL call, but he is not concerned with reporting and engaging hostile batteries in action, which is the duty of the artillery machines.

Wireless will be used only to call for concentrated fire or barrage. Communication with H.Q. of formations will be by dropping maps and by a personal or telephonic report on landing.

Should the enemy be seen to be massing for a counter-attack, an LL call will be sent by wireless to the artillery. Should the enemy be seen to leave his trenches, an S.O.S. call will be sent by wireless to the artillery and a red parachute smoke signal will be dropped to warn the infantry.

11. Employment after a Battle.—Subsequent to an attack by our own troops, it will be especially necessary to warn the command of any indication of hostile counter attack, and counter attack patrols must continue to watch the enemy and to try to discover his dispositions, the movements of his reserves and his strength at various points.

12. Responsibilities of Commanders and Staff.—Success must not be sought by the employment of large numbers of contact and counter attack patrols over the enemy's lines, but by sending out patrols at the proper time, with clear instructions and fully informed as to the latest situation as known

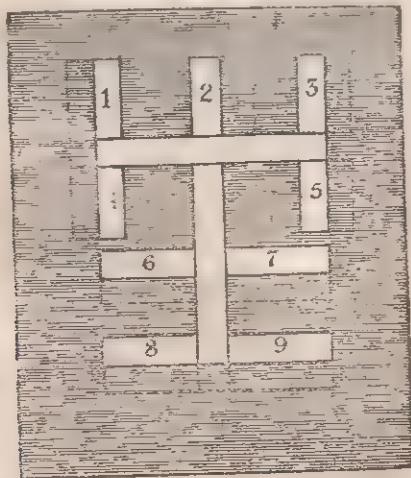
Commanders and staffs when giving orders for such reconnaissance must fully consider the risks run by pilots and observers in carrying them out. At an altitude of 1,500 feet or less an aeroplane is almost certain to be hit by rifle and machine-gun fire from the ground, unless the enemy is fully occupied in fighting. Conditions will arise in which these dangers should and must be run, but it must be borne in mind that the loss of one or two good pilots or observers who know their ground impairs the value and efficiency of squadrons for a considerable time, and is only justified by the chance of obtaining information of really first class importance. When giving orders, the degree of importance attached by the commander to information required should be explained to observers, who will then be able to judge to some extent the risks which they are justified in incurring.

Section 2.

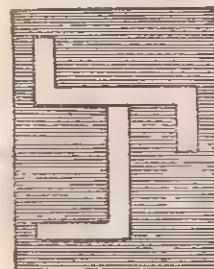
Instructions for using the "T" (Popham) Signalling Panel for Communication between Infantry and Aircraft.

1. **Description.**—The panel consists of a dark blue cloth to which are sewn strips of white American cloth in the shape of the letter "T".

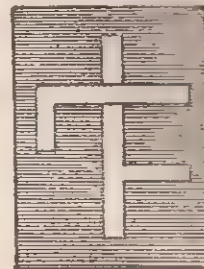
From this "T" project nine arms of white American cloth. These arms are numbered consecutively from 1 to 9, as shewn in Figure, and are always known by these numbers. Each arm is provided with a flap of dark blue cloth, similarly numbered on the outside, so that all or any of the arms can be covered or exposed to view from the air at will. The flaps are numbered to ensure the correct ones being used.



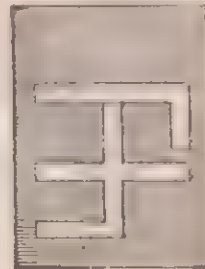
Thus by covering and exposing appropriate arms, a large number of combinations of numerals may be set out, of which the following are three examples:—



158



247



5678

The panel is furnished with pegs and eyelets for pegging it down to the ground.

The complete panel weighs about 12 lbs.

With good visibility messages sent with the panel can be read easily from a height of 3,000 ft.

A simple figure code (see Section 3) is used with the panel, each group of numerals representing a phrase or sentence which the infantry is likely to wish to send to the aeroplane.

2. **Method of Use (Infantry).**—(a) The panel is placed on the ground with the top of "T" nearest the enemy. The panel is pulled taut and pegged down. The ground sheet and code call letters must also be laid out *vide* Section 1, para. 4 (B).

(b) The arms representing the "call up" group are exposed.

(c) The "call up" group is left exposed until answered by the observer, who sends the code call of the brigade or battalion followed by "RD" on the Klaxon horn. The aeroplane observer will distinguish between the 1st., 2nd., 3rd. or 4th. battalion in a brigade, using the same code letters by sending the letter A, B, C or D respectively before the code call. Thus, the reply to the example in Section 1, para. 4 (B), would be sent as: "C AX RD." The aeroplane will pay no attention to any message not preceded by the "call up" group.

(d) The required groups are then set out in turn on the panel, each one being exposed until answered by the aeroplane by "RD" on the Klaxon horn.

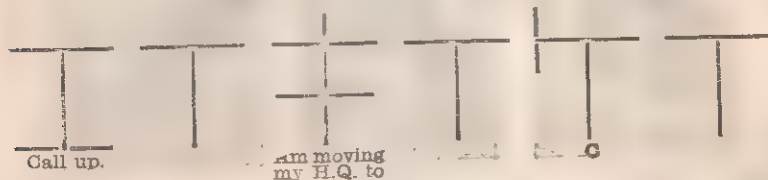
(e) After each group, all arms are covered and left covered until acknowledged by the aeroplane by "RD" on the Klaxon horn, when the next group is sent out.

(f) On conclusion of a message the "Message finished" group is set out and acknowledged by the aeroplane by RD on the Klaxon horn. If it is desired to send another message, the "call up" group is exposed immediately after the "Message finished" group, and when acknowledged, the message is proceeded with. If there are no more messages to send, all the arms are covered, this being an indication to the aeroplane that it may leave.

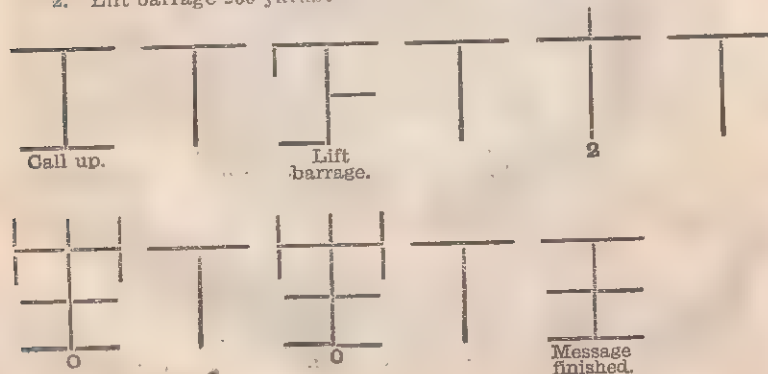
(g) A group of numerals intended to be read as numerals must be broken up and each numeral sent separately. In the case of successive groups of numerals, the "break" sign must be sent between each group.

EXAMPLES.

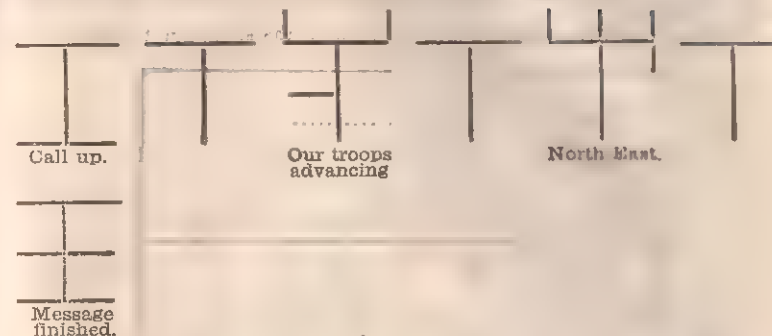
1. Am moving my headquarters to C 27 d 53 :—



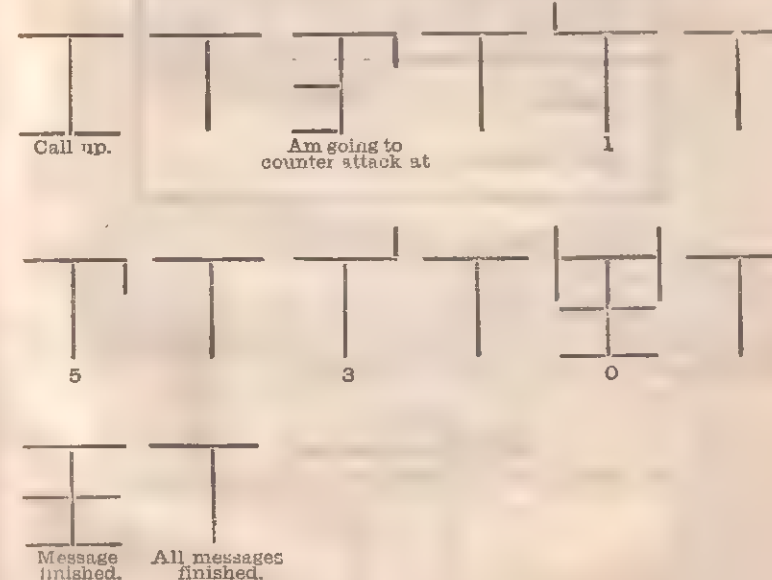
2. Lift barrage 200 yards :—



3. Our troops advancing North-East :—



4. Am going to counter attack at 3.30 p.m. (Army time 15 30) :—



3. Method of Use (Aeroplane).—(a) A small message pad will be carried in the aeroplane.

Each page of this pad will be prepared as in the specimen below :—

Pilot.....			
Observer.....			
Date.....		Time.....	
T	T	T	T
T	T	T	T
T	T	T	T
Brigade.....		Batto.....T.....	
Map Reference.....			

(b) Each group on the panel as seen will be drawn on the pad and acknowledged. The return of the panel to T after each group need not be indicated on the pad.

(c) When the message has been completed, details as to date, time, etc., will be added, and the page or pages used will be dropped at the dropping station. The message will be decoded at the headquarters of the formation at which messages dropped by aeroplanes are received.

Section 3.

LIST FOR ENCODING

Code Messages for use between Infantry and Aeroplanes.

1	...	...	1	A	...	...	12
2	...	...	2	B	...	...	13
3	...	...	3	C	...	...	14
4	...	...	4	D	...	...	15
5	...	...	5	E	...	...	16
6	...	...	6	F	...	...	17
7	...	...	7	G	...	...	18
8	...	...	8	H	...	...	19
9	...	...	9	I	...	...	23
0	...	...	123456789	J	...	...	24

K	...	...	...	25	W	...	...	...	46
L	...	...	...	26	X	...	...	...	47
M	...	...	...	27	Y	...	...	...	48
N	...	...	...	28	Z	...	...	...	49
O	...	...	...	29	Erase	...	...	...	68
P	...	...	...	34	Repeat	...	...	...	69
Q	...	...	...	35	Break sign	...	...	...	70
R	...	...	...	36	Call up...	...	...	...	89
S	...	...	...	37	Message finished	...	...	...	67
T	...	...	...	38	RD (for acknowledging signals from the air)...	...	...	...	67
U	...	...	...	39					
V	...	...	...	45					

Attacking.

Have gained first objective	...	...	...	215
" " second	...	...	...	216
" " third	...	...	...	217
" " final	...	...	...	243
Am about to advance	...	...	...	567
Our troops advancing (followed by direction sign)	...	...	...	136
No reports from attacking troops yet	...	...	...	145

Counter Attacking.

Am going to counter attack (followed by time)	...	...	...	568
Our counter attack successful	...	...	...	578
Our counter attack failed	...	...	...	589

Held up.

Unit on my right held up	...	...	...	256
" " left	...	...	...	257
Held up by wire at (followed by distance in yards followed by direction sign)	...	...	...	678
Held up by fire from (followed by direction sign)	...	...	...	679

Situation.

Am moving my headquarters to (followed by co-ordinate)	...	...	...	267
Am in touch with unit on my right	...	...	...	234
" " " " " " left	...	...	...	235
" " " " " " on both flanks	...	...	...	236
Am NOT in touch with unit on my right	...	...	...	258
" " " " " " left	...	...	...	259
Our troops at (followed by co-ordinates)	...	...	...	134
No reports from attacking troops yet	...	...	...	145
Have sent situation report by runner	...	...	...	135
Casualties heavy	...	...	...	137
" " " " pigeon	...	...	...	156

Enemy Attacking.

Enemy massing at (followed by distance in yards followed by direction sign)	...	...	...	456
Enemy has broken through on my right	...	...	...	467
" " " " " " left	...	...	...	468
" " " " " " centre	...	...	...	469
Enemy at (followed by co-ordinates)	...	...	...	167
Our troops retiring (followed by direction sign)	...	...	...	168

Enemy Counter Attacking.

Enemy massing at (followed by distance in yards	456
followed by direction sign) ...	457
Enemy counter attacking ...	458
" " " " from (followed by direction	458
sign) ...	589
Enemy counter attack repulsed ...	589

Artillery.

S.O.S. ...	345
Anti-Tank gun in action at (followed by co-ordinates) ...	459
Further bombardment required ...	346
Shorter barrage (followed by distance in yards) ...	347
Lift ...	478
Barrage not required ...	579

Wanted.

Reinforcements wanted ...	157
More stretcher bearers required ...	158
Short of rations ...	123
" " pigeons ...	124
" " S.O.S. signals ...	125
" " ammunition ...	126
" " water ...	129
" " bombs ...	127
" " rifle bombs ...	128

Direction.

North ...	1234
North-East ...	1235
East ...	1246
South-East ...	1247
South ...	1258
South-West ...	1259
West ...	1345
North-West ...	1346

LIST FOR DECODING

Messages for use between Infantry and Aeroplanes.

1.	1.
2.	2.
3.	3.
4.	4.
5.	5.
6.	6.
7.	7.
8.	8.
9.	9.
12.	A
13.	B
14.	C
15.	D
16.	E
17.	F
18.	G
19.	H

Figures.

Cipher 0=123456789

23.	I
24.	J
25.	K
26.	L
27.	M
28.	N
29.	O
34.	P
35.	Q
36.	R
37.	S
38.	T
39.	U
45.	V
46.	W
47.	X
48.	Y
49.	Z

- 56.
- 57.
- 58.
- 59.
67. RD (for acknowledging signals from the atij.
68. Erase.
69. Repeat.
- 78.
79. Break.
89. Call-up.
123. Short of rations.
124. Short of pigeons.
125. Short of S.O.S. signals.
126. Short of ammunition.
127. Short of bombs.
128. Short of rifle bombs.
129. Short of water.
134. Our troops at (followed by co-ordinates).
135. Have sent situation report by runner.
136. Our troops advancing (followed by direction sign).
137. Have sent situation report by pigeon.
- 138.
- 139.
145. No reports from attacking troops yet.
- 146.
- 147.
- 148.
- 149.
156. Casualties heavy.
157. Reinforcements wanted.
158. More stretcher bearers required.
- 159.
167. Enemy at (followed by co-ordinates).
168. Our troops retiring (followed by direction sign).
- 169.
- 178.
- 179.
- 189.

234. Am in touch with unit on my right.
235. " " " " " " left.
236. " " " on both flanks.
237.
238.
239.
245. Have gained first objective.
246. " " second "
247. " " third "
248. " " final "
249.
256. Unit on my right held up.
257. " " my left
258. Am not in touch with unit on my right.
259. " " " " " " left.
267. Am moving my headquarters to (followed by co-ordinates).
268.
269.
278.
279.
289.
345. S.O.S.
346. Further bombardment required.
347. Shorter barrage (followed by distance in yards).
348.
349.
356.
367.
368.
369.
378.
379.
389. Our counter-attack failed.
456. Enemy massing at (followed by distance in yards, followed by direction sign).
457. Enemy counter-attacking.
458. " " " " " " from (followed by direction sign).
459. Anti-tank gun in action at (followed by co-ordinates).
467. Enemy has broken through on my right.
468. " " " " " " left.
469. " " " " " " centre.
478. Lift barrage (followed by distance in yards).
479.
489.
567. Am about to advance.
568. Am going to counter-attack at (followed by time).
578. Our counter-attack successful.
579. Barrage not required.
589. Enemy counter-attack repulsed.
678. Held up by wire at (followed by distance in yards, followed by direction sign).
679. Held up by fire from (followed by direction sign).
689.

789.
1234. North.
1235. North-East.
1246. East.
1247. South-East.
1258. South.
1259. South-West.
1345. West.
1346. North West.
6789. Message Finished.

Appendix C.

CO-OPERATION BETWEEN AIRCRAFT AND TANKS.

1. The work required of the R.A.F in co-operation with tanks consists of :—

- (a) Contact patrol.
- (b) Counter attack patrol.
- (c) Offensive action against anti-tank guns and other obstacles to the advance of tanks.

A. Contact Patrol.

2. (i.) The primary duty of contact patrols is to keep tank battalion and company headquarters constantly informed as to the progress of their tanks and of our troops generally. The tops of tanks must be conspicuously marked in order that they can be recognized as our own. A large white number on a dark background is a suitable marking. A signal should also be arranged to denote to the observer that a tank is held up by anti-tank guns. Information is conveyed by dropping messages. Each battalion headquarters must establish a message dropping station, the location of which must be known to the squadron which finds the contact patrols. If necessary, stations can be marked by ground strips, the signal being mutually agreed upon beforehand. The observer will indicate to the dropping station that he is going to drop a message by flying low over it and firing a Very light. Battalions transmit the information back to tank brigades by telephone or by wireless. Messages for tank companies will normally be dropped at the headquarters of the infantry brigade with which they are working, which is usually in close touch with the tank company commander. Pilots and observers must know the letter calls of the infantry brigades concerned. Messages dropped to tank rallying points will, however, often be of value, because immediate action can then be taken upon them. The most suitable time to drop such messages is when tanks are rallying under cover during a pause in the advance. Rallying points can often be recognized, if not pre-arranged, by the collection of petrol tins brought up to refill the tanks.

(ii.) In the event of tank operations with a distant objective, aeroplanes may be able to assist tank companies and sections by guiding them towards their destination and also by giving them information regarding hostile troops to their front and flanks. This can be done in either case by means of a species of semaphore signals attached to the bottom edge of the sides of the fuselage and worked by means of handles in the observer's cockpit.

(iii.) In addition, aeroplanes may be employed to cover a concentration of tanks by flying over the area of concentration and dropping bombs, thus drowning the noise of the assembling tanks.

B. Counter-Attack Patrol.

3. (i.) The primary duty of counter-attack patrols is to keep tank battalion and company commanders constantly informed regarding the enemy's movements and dispositions. In the case of a small operation, in which comparatively few tanks are taking part, the duties of contact and counter-attack patrol can be performed by the same machine, but, in the case of an operation on any considerable scale, separate machines must be detailed. Tank brigade and battalion commanders, who will probably have reserves at their disposal, are principally concerned with the broader aspect of the battle, e.g., centres of resistance, movements of reserves, main location of artillery, and information upon such points will enable them to throw in their reserves at the right time and place. Tank company commanders, on the other hand, are concerned with the progress of the action on the immediate front of their companies and require information concerning anti-tank guns, strong points, and other obstacles to the immediate advance tanks.

Two methods of communication are available:—

- (a) Message dropping;
- (b) Wireless.

Message dropping is the principal method of communication. Wireless messages take the form of zone calls. In addition to being received at the battery station, these are taken in at the central information bureaux established by the R.A.F. at corps central wireless stations or elsewhere. A tank wireless transmitting station (C.W.) should be established at the central information bureau working on the R.A.F. wavelength. Messages of interest to tanks received at the central information bureau can then be passed on to tank battalions and companies over the tank wireless system.

C. Offensive Action.

The enemy relies to a great extent upon his artillery for anti-tank defence.

Every endeavour must be made by the aeroplanes working with tanks to locate and silence the enemy's anti-tank guns with bombs and machine-gun fire. A percussion smoke bomb should be dropped on the target by the machine which discovers it as a signal to other machines.

It is extremely difficult to locate these guns from the air before they open fire. Maps should be prepared by tanks and R.A.F. in co-operation shewing likely places for anti-tank guns, e.g., edges of small woods, sunken roads, battery positions, especially when these are situated in such a position as to catch tanks coming over a rise at short range. These maps must be carefully studied by pilots and observers, and all likely places must be carefully reconnoitred, and, even if they do not appear to be occupied, should be attacked with bombs and machine gun fire immediately before the tanks are coming up to them.

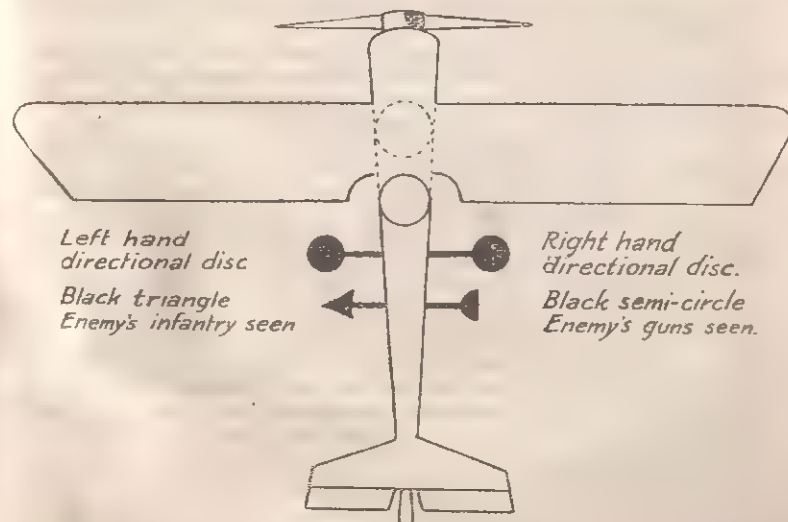
This offensive action will be undertaken by the counter-attack patrols when their other duties permit, but, whenever possible, special machines should be detailed for the work. It is essential that the pilots of these machines should be thoroughly acquainted in detail with the ground on which they are to operate. The actual methods of carrying out the work must depend upon circumstances; it may often be advisable to detail a few machines to reconnoitre the area and to fire a percussion smoke bomb as a signal when they discover a target, while the remaining machines fly just behind the advancing tanks ready to attack immediately whenever any target has been signalled.

The black triangle and black semi-circle should be used in conjunction with directional discs, as follows:—

<i>Black semi-circle</i> in conjunction with right directional disc ...	... =	Enemy's guns located to right front.
" " Same—with left directional disc	=	Enemy's guns located to left front.
" " Same—with both directional discs	=	Enemy's guns straight ahead
<i>Black triangle</i> in conjunction with right directional disc ...	... =	Enemy's infantry to right front.
" " Same—with left directional disc	=	Enemy's infantry to left front.
" " Same—with both directional discs	=	Enemy's infantry straight ahead.

Directional signals with black disc:—

<i>Right hand directional disc</i> out ...	... =	Turn 45° to right.
This signal repeated ...	... =	Turn 80° to right.
<i>Left hand directional disc</i> out ...	... =	Turn 45° to left.
This signal repeated ...	... =	Turn 90° to left.
<i>Both directional discs</i> out ...	... =	Straight ahead.



DUTIES OF DIVISIONAL INTELLIGENCE BEFORE AND DURING THE ATTACK.

I.—Before the Attack.

(a) *In the case of a division which is in line some time beforehand.*—As soon as the orders for an attack are issued, and the front of attack and objectives allotted to the division, all the intelligence organization of the division, should be directed to the thorough study of the ground to be attacked, and the enemy's attitude and dispositions.

The four principal sources of information are:—

- (1) Aeroplane photographs (both vertical and oblique).
- (2) Observation.
- (3) Patrol reports.
- (4) Prisoners' statements and captured documents.

The first essential is the establishment of observation posts from which the maximum amount of the enemy's line is visible.

Where observation over the enemy's lines is good, an intelligent combination of (1), (2) and (3) will reveal practically the whole of the enemy's defensive organization and habits. Information derived from prisoners' statements and documents is most valuable in supplementing and confirming this.

The objects of this preliminary study of the enemy's defences and dispositions are:—

- (1) To enable the intelligence branch to produce accurate maps, on which all detailed information likely to be useful to the attacking troops is shewn.
- (2) To locate definitely the position of the enemy's supports and reserves, and to ascertain his probable routes of approach.
- (3) To determine the points from which the best observation over the enemy's country can be obtained during, and subsequent to, the attack.

A detailed knowledge of the enemy's trench system (machine gun emplacements, trench mortar emplacements, dug outs, headquarters, wire, forward dumps, etc.) and full information as to the minor tactical features, such as streams, woods, banks and marshy ground, is essential.

Battalion and subordinate commanders should be able to fix beforehand suitable dug-outs for occupation as command posts as the advance goes forward. Moppers up and especially selected intelligence personnel should know where headquarters, telephone exchanges, wireless stations, deep dug-outs, &c., are situated, and should be provided with large scale maps on which all these are shewn. The detection of machine gun nests is of vital importance.

Observation posts, signal exchanges, headquarters and the enemy's routes of approach must be noted with a view to their being dealt with by artillery at, or immediately before, zero. It must be remembered that on intelligence will depend, to a large degree, the successful and thorough artillery, tank, and machine gun work which is such a large factor in obtaining success combined with a small casualty list. As high a proportion as possible of the intelligence personnel of brigades and battalions should be trained to read aeroplane photographs. Even if ground observation is indifferent, a study of these in conjunction with oblique photographs will give a very fair idea of the ground to be attacked.

(b) *In the case of a division which is brought up at short notice for the attack.*—Shortness of time and the requirements of secrecy prevent the intelligence organization of a division from operating to any great extent before the attack is launched. All the necessary intelligence, therefore, must be obtained from the division and corps holding the line. The attacking troops must be provided with an accurate map shewing the enemy's defensive organization and should also be supplied with air photographs both oblique and vertical.

The map should be a battle intelligence map, on which should be overprinted the tactical information required for the operations, e.g., hostile batteries, dispositions, headquarters, machine gun nests, trench mortar emplacements, occupied trenches and occupied areas. Such information should not be overprinted so heavily as to obscure the topographical detail of the map.

II.—During the Attack.

(a) *General.*—The rôle to be played by the intelligence organization after the attack has been launched must be carefully thought out and rehearsed beforehand; its primary duty is to furnish the commander with information both of the movements and intentions of the enemy, and of the progress of our own troops. All efforts should be concentrated on securing continuous observation of the battlefield, and perfecting all possible means of communication.

The duties of the intelligence organization include the progressive establishment of observation posts as the attack goes forward, the guiding of reinforcements, and the establishment of forward sniping posts. In all cases, a thorough knowledge of the ground to be attacked is a first essential; during the period of preparation, too much time cannot be devoted to its study, both from the ground and from aeroplane photographs.

(b) *Observation.*—A divisional observation section plays a very important part during an action. It serves as an independent and supplementary channel of information for the divisional commander, and should be trained to act in this capacity during the battle. Existing divisional observation posts are normally connected by a direct line with divisional headquarters, and the earlier stages of the attack can be watched and progress reported from these posts. As the attack moves forward, the section details groups of observers, which must include signallers, pigeonmen and runners or mounted orderlies; these move to previously selected observation posts farther forward, from which successive stages of the battle can be observed. Good communication has proved to be invaluable and important information has been received from divisional observers at periods during which information from other sources has been lacking. The greatest care must be taken to arrange beforehand for communication during an advance, as a good intelligence system is practically valueless without a good system of communications. In the training of the section, an important point to be borne in mind is the means of disseminating to all concerned, in the shortest possible time, information gained by the observers; a satisfactory scheme must be worked out beforehand. Their expert knowledge of the ground makes the personnel of this section invaluable as guides or for special reconnaissances to clear up the situation. After the capture of the final objective, their first duty is to establish a divisional observation post, and to watch for the enemy's reaction or signs of further withdrawal. Touch should at once be established with the nearest headquarters, to which all messages should be sent, if quicker methods of communication with the division cannot be arranged. The need for thorough previous training is evident; each man of the section must know his task. Care must be taken that a small reserve of fresh men is always maintained to provide for regular reliefs in the observation posts.

(c) *Identifications from prisoners and captured documents.*—In a division, the divisional intelligence officer is the authority on the German order of battle, and during an attack he should move up to positions where he can see prisoners with as little delay as possible, report identifications and select prisoners for a short preliminary examination on points likely to be of immediate value in the operations. It is essential that he should be in telephonic communication with the general staff of the division, if possible, by a direct line.

Arrangements must be minutely worked out with battalions and with the provost marshal's branch, to ensure prisoners being sent back quickly and that the arrangements for searching officers, for the separation of prisoners (i.e., officers and non-commissioned officers separated from the men), and for the prevention of the destruction of valuable documents by them, are thoroughly understood. In order to obtain identifications more rapidly, some formations have specially trained certain of their intelligence personnel in the obtaining of identifications from identity discs and pay books, and these identifications are passed back immediately to the division from the battlefield. The value of speed in obtaining identifications cannot be sufficiently emphasized, and the preliminary training in this work of a certain proportion of the intelligence personnel is amply repaid. The organization of special parties of intelligence personnel for searching the dead and the battlefield generally, and well-known headquarters, telephone exchanges, etc., in particular, is an important point, and arrangements should be made for sending back as quickly as possible all documents thus obtained. Unless definite arrangements are made beforehand to send back captured documents quickly, it will generally be impossible to obtain any value from them during the battle.

Appendix E.

DUTIES OF FIELD COMPANIES, R.E., AND PIONEERS IN THE OFFENSIVE.

(1) The duties of the field companies, R.E., and the pioneer battalion of a division, and the principles governing the employment of these units are explained at length in S.S. 145 "Notes on Engineer work during operations (Jan., 1918)." It is, therefore, unnecessary to give more than an outline of them here.

The pamphlet should be read carefully by all commanders under whom engineers and pioneers may be employed.

(2) Some of the duties, in addition to preparing roads and tracks, for which the engineers (field companies and any special engineer units which may be attached to the division) and pioneers are required after a successful attack, are:—

(a) Engineer reconnaissance of every description; e.g., roads, bridges, sources of water-supply, enemy dumps, dug-outs for use as H.Q., etc.

(b) Bridging trenches, and filling in shell holes, etc., to enable field artillery and trench mortar units to get forward.

(c) Supervision of the construction of supporting points, and putting localities in a state of defence.

(d) Marking out routes, providing and fixing signboards, direction marks and lamps.

(e) Blocking routes and trenches not required for communication, to prevent troops losing their way.

(f) Opening up sources of water supply and making water points.

(g) Formation of engineer dumps.

(h) Repairing and constructing bridges for wheeled traffic.

(i) Extension (or construction) of push tramways for carriage of stores and evacuation of wounded.

The order of importance of the above tasks depends upon circumstances.

(3) The following work, though normally undertaken by the corps, may at times be allotted to divisions:—

(a) Reconnoitring for and rendering harmless, mines and traps left by the enemy.

(b) Repair of roads leading forward and construction of bridges to take tanks, heavy artillery, etc.

(c) Extension of piped water supply systems, and the further development of water points and sources of supply referred to in para (2) (f) above.

(4) In the employment of divisional engineers and pioneers the following considerations should be borne in mind:—

(a) They should, as a general rule, be treated as reserves. The best results will usually be obtained by keeping them back until the progress of the fight permits of their being sent forward, under orders issued by the C.R.E., to execute definite pieces of work.

(b) They should not be lost to divisional control by affiliating or allotting them to brigades except for the execution of some definite piece of work, on the completion of which they should return to divisional control.

(c) They must not be sent forward with the assaulting troops nor should they follow them too closely. If they do, they will inevitably be involved in the fighting and become disorganized, tired out and unfit for technical work.

(d) To ensure, however, that no time is lost, it is usually best to assemble the different parties to which work has been allotted in a particular brigade zone of operations in the vicinity of that brigade headquarters by zero hour. The remainder, to save loss of time in communicating orders, should be assembled at some central place which is in direct communication with divisional headquarters.

(e) The personnel of field companies is comprised of skilled men, and should not be employed on unskilled work except in great emergencies.

(f) To obtain satisfactory results, labour in some form or other must be attached to the engineers for the performance of such unskilled work as carrying stores and simple digging.

(g) The pioneer battalion is best employed on work which does not involve highly skilled labour, but does require a heavy continuous expenditure of trained effort, e.g., making tracks, improving roads, etc.

(h) On principle, no smaller detachment than a section of a field company or a company of pioneers should be made. Small parties of engineers and pioneers sent forward with attacking troops can accomplish very little. They merely incur casualties without being able to do any engineer work.

(i) Engineers and pioneers require a certain amount of time to organize their work and to collect the stores and apparatus necessary to execute it. They should, therefore, be given as much notice as is possible, and the transport or carrying parties which are essential.

(j) At the outset, if possible, not more than half the engineers and pioneers available should be employed, so as to provide relief and a reserve for use in unforeseen emergencies.

(5) An engineer officer should be attached as liaison officer to each infantry brigade headquarters. He will act as technical adviser to the infantry brigadier, and will be responsible for sending back to the C.R.E. early notice of requirements.

(6) It is important that the field company engineers and the pioneer battalion should take part in all practice assaults of the division and brigades during training.

Appendix F.

TRAFFIC CONTROL.

1. A divisional traffic control establishment consists of 40 men, who are borne on the strength of the divisional employment company.

2. The A.P.M. of the Corps is responsible for the control of traffic in the whole corps area and will allot a sub area (coinciding as far as possible with the divisional area) to the D.A.P.M.

3. The corps is responsible for the control of the area in rear of the divisional area.

4. Direction notices should be provided for all roads and tracks in the divisional area. If this is done, any necessity for the erection of notice boards immediately before offensive operations begin will be largely avoided.

5. A special system of traffic telephone should be installed and important points linked up as the advance proceeds.

First aid lorries and caterpillars should be at hand at convenient places (near telephones), to clear obstruction on main roads.

6. Dumps and water points should not be placed by the side of main roads, but should be so constructed that vehicles when loading or unloading, or waiting to draw up, are entirely off the main road.

7. Traffic maps must be provided on a liberal scale.

8. It is important that the orders regarding the restriction of movement in the forward area should be made known to all concerned.

9. Guides should be detailed to meet columns of transport which are due to arrive and are not acquainted with the locality: this saves vehicles halting on the main roads, whilst officers and non-commissioned officers are endeavouring to discover their destination.

10. Traffic control orders are contained in S.S. 724.

11. Notes on the system of working traffic, instructions for the guidance of traffic control posts, etc., are contained in S.S. 414.

Appendix G.

SYNCHRONIZATION OF WATCHES.

The importance of the accurate synchronization of watches is not always realised. A difference of a few seconds between watches may have the most serious effect on the chances of success of an assault.

All officers must acquire the habit of checking their watches daily with the official time, which can be obtained from the signal service. Commanders must pay special attention to this point during training. In synchronizing watches, it is not sufficient to check the minute hand only. The exact position of the second hand must also be noted, and the necessary allowance made.

This gives a more accurate result than can be obtained by moving the hands of the watch, which is seldom done with perfect accuracy.

When watches are being synchronized before an attack, the staff or other officers employed on this duty should always carry two watches, as one may get out of order. The use of the telephone for synchronization of watches is forbidden.

Appendix H.

PRISONERS.

Surrenders.—It is the duty of all ranks to continue to use their weapons against the enemy's fighting troops, unless and until it is beyond all doubt that these have not only ceased all resistance, but that, whether through having voluntarily thrown down their weapons or otherwise, they have definitely and finally abandoned all hope or intention of further resistance. In the case of apparent surrender, it lies with the enemy to prove his intention beyond the possibility of misunderstanding before the surrender can be accepted as genuine.

Size of Escorts.—These should not exceed 10 per cent. of the prisoners in each batch; no more men than are absolutely necessary should be sent back from the front line; carrying parties returning for more stores and slightly wounded walking should be used where possible. Unwounded prisoners should be used to assist in carrying back stretchers with wounded men.

Appendix I.

WOUNDED.

Slight Wounds.—Officers and men who are wounded in the course of the operations, but whose wounds do not wholly incapacitate them, should continue to take an active part in the fight until ordered to the rear by a superior officer.

The presence of a wounded officer, non-commissioned officer or man in the ranks who, though wounded, has the grit to continue fighting, is a fine example of courage to his comrades.

Discarding of Arms and Equipments.—Wounded men must not be allowed to discard their arms and equipment, unless their wounds are so severe as to render the men incapable of carrying them.

The soldier must be taught that it is a point of honour to carry his arms as long as he possibly can. Lightly wounded (walking cases) who have disobeyed this order should be sent back by the police to fetch their rifles and equipment.

Appendix J.

NUMBER OF OFFICERS AND OTHER RANKS TO BE LEFT BEHIND BEFORE AN ATTACK.

1. Infantry battalions, machine gun companies and light trench mortar batteries must not go into an attack with their full complement of officers and other ranks; a certain proportion must always be left behind to form a nucleus upon which to reorganize the unit in the event of heavy casualties.

2. The following is the minimum number of officers and other ranks which must remain behind when the battalion goes into action. Such officers and other ranks will not be available as reinforcements.

Battalion H.Q.		Officers	O.B.	Officers	O.B.
C.O. or 2nd in command	...	1	—	—	—
Adjutant or asst. adjutant	...	—	2	—	—
Signallers	...	—	4	—	—
Instructors	...	—	2	2	8
Batmen	...	—	—	—	—
<hr/>					
4 Company H.Q.		Officers	O.B.	Officers	O.B.
Company commander or 2nd in command	...	1	—	—	—
C.S.M.	...	—	4	—	—
Signallers	...	—	4	4	10
Batmen	...	—	—	—	—
<hr/>					
16 Platoon H.Q.		Officers	O.B.	Officers	O.B.
Platoon commanders	...	4	—	—	—
N.C.O.s	...	—	12	—	—
Batmen	...	—	4	4	16
<hr/>					
64 Sections		—	—	—	16
				10	50

3. A minimum of 25 per cent. of officers and other ranks must be left behind by machine gun companies and light trench mortar batteries when going into action. Such officers and men will not be available as reinforcements.

Appendix K.

DRESS AND EQUIPMENT.

1. *Officers.*—All infantry officers taking part in an attack must be dressed and equipped exactly the same as their men. Sticks are not to be carried.

2. *Fighting Order.*—It is impossible to lay down definitely the equipment to be carried in an attack. It must depend upon the distance of the objectives, the condition of the ground and other circumstances. Weight must always be the guiding factor in arriving at a decision in the matter of equipment. The following is suggested as a normal fighting order for all ranks of infantry, machine gun, light mortar and engineer units:—

(i.) *Clothing, etc., worn on the men.*—As issued.

(ii.) *Arms.*—As issued.

(iii.) *Entrenching Tool.*—As issued.

(iv.) *Accoutrements.*—As issued, with pack.

(v.) *Box Respirator.*

(vi.) *Solidified Alcohol.*—As issued.

(vii.) *Articles Carried in the Pack.*—Mess tin, cardigan jacket, when issued, pair of socks, spare oil tin, holdall, iron ration, unexpended portion of day's ration, waterproof sheet, and two sandbags.

(viii.) *Ammunition.*—170 rounds, except for signallers, scouts, runners, machine, Lewis and Stokes mortar gunners and carrying parties, who will only carry 50 rounds.

(ix.) *Bombs.*—The number to be carried must be determined by the task to be carried out, the condition of the ground and the general physique of the man. (See S.S. 182, "Instructions on Bombing," Part II, para. 28.)

(x.) *Aeroplane Flares.*—Two, carried one in each bottom pocket of the jacket. They are not required by engineer, pioneer, machine gun and light mortar units.

(xi.) *Water.*—One filled water-bottle. A second water-bottle is useful when there is likely to be difficulty in sending up water, or in warm weather.

3. *Disposal of Surplus Clothing and Equipment.*—The surplus clothing and equipment of each man will be tied up in his haversack or a labelled sand bag, which will be stored under cover at the unit's transport lines or in some suitable building, if available.

4. In addition to the munitions and stores mentioned in paragraph 2, the following ammunition, stores, etc., may be required:—

(i.) *Wire Cutters and Breakers.*—Wire cutters must be attached to the man's shoulder strap by a string, and the cutters tucked into his waist belt.

(ii.) *Picks and Shovels.*—The tools should be carried on the back.

(iii.) *S.O.S. Signals.*—Twelve should be carried by each company, to be distributed among the reserves.

(iv.) *Artillery Flags or Discs.*—One to be carried by a selected N.C.O. or man in each platoon of assaulting units.

(v.) *P. or K.J. Bombs.*—Carried by parties especially detailed for clearing trenches and dug-outs.

(vi.) *Hand and Rifle Bombs.*—Carried by bombers and rifle bombers, either in waistcoats, haversacks, or canvas buckets. (See "Instructions on Bombing," Part II, para. 28.)

(vii.) *Very Pistols.*—Two 1-in. Very light pistols should be carried with each company headquarters for signalling to the artillery.

5. *Issue of S.A.A., Tools, etc.*—In order to save the men unnecessary fatigue, it may be possible to issue the S.A.A., bombs, tools, flares, S.O.S. signals, etc., mentioned in paragraphs 2 and 4, which are not part of the man's ordinary equipment, at a forward dump. This dump must be sufficiently far back, however, to avoid the danger of heavy shell fire and the resulting confusion.

These stores, which are additional to the establishment fixed for the dump, should be laid out beforehand, so that no time may be lost in issuing them.

Appendix L.

DISTINGUISHING MARKS.

1. In order to assist liaison and organization after an attack, all men should carry some distinguishing mark. This mark will indicate the division, brigade and battalion to which the man belongs.

2. In addition, the following distinguishing marks should be worn:—

Scouts	Green band.
Runners	Red band.
Regimental and Company Signallers	Blue band.
Carrying Parties	Yellow band.
Salvage parties	Khaki band with "Salvage" in red letters.

These bands will be 1½-in. wide, and will be worn round the left forearm.

3. When more than one objective has been allotted, it has been found of value to give the troops allotted to each objective a distinctive mark, such as a patch of paint on the helmet.

Appendix M.

DOCUMENTS AND MAPS.

All ranks taking part in an assault or raid are forbidden to carry any letters, papers, orders or sketches which, in the event of their capture, would be likely to give any information to the enemy.

Officers should not be overburdened with maps. The message maps should, however, be issued in packets of five down to platoon commanders. Officers should carry the 1/100,000 map in addition.

Pigeon message maps have been used with success, and should be issued down to company commanders.

Appendix N

MEDICAL ARRANGEMENTS.

1. It is essential that the A.D.M.S. should work in the closest touch with the general staff, to ensure the quick and efficient evacuation of the wounded.

2. In the allotment of available dug-outs, captured "pill-boxes" or other cover, the claims of the aid posts must not be forgotten.

In original attacks the regimental aid posts should be as far forward as possible, so that they will serve their purpose as the advance proceeds.

3. As the advance proceeds, the regimental aid post should remain in its original position until such objective is definitely secured and a safe and suitable dug-out or other cover marked down and got ready for it to advance into.

4. Any change in position of the aid post should be communicated at once by the battalion medical officer to the bearer division of the field ambulance which is working up to it.

5. The normal number of regimental bearers in a battalion should at least be doubled and the additional bearers placed as reserve under the control of the regimental medical officer at the aid post.

The regimental and reserve regimental bearers should not be employed in bringing wounded further back than to the aid post.

6. The best way to employ bearers, as the advance proceeds, is for the normal battalion bearers to collect the wounded to safe places along the advance, and for the reserve bearers to go out to collect them from there to the regimental aid post. Places to which wounded are collected in groups should be indicated by flags, and a sufficient number of these should be kept by the regimental bearers.

7. The evacuation of wounded from the regimental aid posts must be carried out by the bearer divisions of field ambulances, supplemented, when necessary, by bearer divisions of field ambulances not engaged, and by extra bearers drawn from infantry units not engaged. No batch of prisoners should go back unloaded so long as there are wounded to carry back.

8. As the advance proceeds and the regimental aid posts take up new positions, relay posts must be formed to work from one cover to another. The longest carry in each relay should not exceed 1,000 yards and should preferably be 500 or 600 yards. The number of extra bearers required to work in these relays in one division was 600 at one time. As a rule, a reserve of 200 has proved sufficient.

9. Relays should be continued to a point where trolley lines can be used for the farther carry-back to the advanced dressing stations. A post with suitable cover should be formed at the point at which the relay carry is transferred to trolley or other vehicular transport.

10. The position of the advanced dressing station should be such that it can be cleared quickly by means of tramways, light railways and motor ambulances.

It should be connected with divisional headquarters by telephone, and the D.A.D.M.S. of the division should be there as much as possible in order to keep the A.D.M.S. informed of the progress of evacuation.

11. The A.D.M.S. is responsible for the marking of all medical posts and lines of evacuation in the divisional area. He will obtain the help of the R.E. through the general staff, for the laying of the necessary tracks, repair of roads for motor ambulances, and the adaption of existing cover to medical requirements.

12. Soup kitchens should be established at all main and advanced dressing stations under arrangements to be made by divisions.

Appendix O.

USE OF GAS AND SMOKE.

(See also S.S. 134, S.S. 175 and S.S. 217.)

GAS.

1. Before the Attack:—

Before an attack, if the enemy is in occupation of a prepared position, it may be possible to concentrate suddenly on strong points and localities sufficient gas (discharged either from cylinders or projectors, or emitted by means of shell fire) to cause casualties and to lower the moral of the defending troops.

If B.B. shells are used for this purpose, it will be possible to prevent the enemy from occupying definite areas, and so to disorganize his reliefs, ration parties, ammunition supply, etc.

2. Counter-Battery Work:—

Gas shells can be usefully employed in counter-battery work. During the earlier stages of a preliminary bombardment, the shelling of the enemy's batteries with gas—especially B.B.—may inflict casualties and will reduce the efficiency of the personnel by compelling the gunners to wear masks for long periods. Immediately before and during an attack, gas shells can be employed for the neutralization of the enemy's artillery.

3. Use of Non-persistent Shell in the Barrage:—

The employment of non-persistent gas shells in the creeping barrage, apart from the casualties which they may cause, will compel the enemy's troops to wear gas masks, and so add to the confusion and impede the rate and accuracy of their fire.

4. Use of Persistent Shell in the Attack:—

Persistent natures of gas shells can be used on the flanks of the attack or beyond the limits of the objectives, or on important targets (e.g. battery positions) within the objectives, provided that care is taken not to contaminate large areas. Targets which are to be engaged with persistent gas must be notified to the attacking troops so that they may avoid them altogether, or pass over them as quickly as possible after a suitable interval has elapsed. Long halts or digging on ground which has been shelled recently with persistent gas must not be allowed.

B.B. shells can be used to render untenable positions, such as towns or woods, which it is intended to outflank and not to occupy.

5. Gas Grenades:—

No. 28 Mk. II grenades filled K.J. may be used by parties detailed to clear dug-outs. The gas contained in these grenades is not lethal, but it causes violent coughing. Our respirator gives complete protection against this form of gas, but the German respirator is penetrated immediately. The effect of these grenades lasts for only a short time: our own troops could enter a dug-out at once if wearing respirators, and in less than an hour's time they might remain there unprotected.

No. 28 Mk. II grenades filled K.S.K. can be used for contaminating any dug-outs with a strongly lachrymatory atmosphere if, for any reason, it is necessary to abandon them.

SMOKE.

6. Smoke Screens:—

Smoke screens may be produced by artillery shells, trench mortar bombs, smoke candles, smoke generators and No. 27 grenades. They have been found of great value for the following purposes:—

(i.) To increase the screening effect of a barrage of shrapnel or H.E. This use applies especially to a barrage covering a tank attack.

(ii.) To conceal an advance from observation, or from machine gun and rifle fire from the front or from a flank. In the latter stages of an advance, if the infantry is held up by a machine gun nest, a few rounds of smoke shell or a few No. 27 grenades may blind the enemy's gun detachments, thus enabling the infantry to work forward and to rush the position under cover of the smoke.

(iii.) As a feint, to distract the enemy's attention.

7. Use of Smoke Shell as Signals:—

Smoke shells may be used to mark the position of the protective barrage more clearly, as, when the rate of fire has slowed down, it is sometimes difficult for the infantry to realize that a protective barrage still exists.

They may also be used to indicate to the infantry a wheel in the barrage. For instance, shrapnel or H.E. may continue to be fired while a wheel is taking place; then, as soon as the barrage is formed on its new alignment, a number of smoke shell may be fired as a signal that the barrage is about to advance again.

8. Precautions:—

In making arrangements for the production of smoke screens attention must be paid to the following points:—

(i.) If the screen is too thick, it is apt to interfere with counter-battery work owing to the smoke drifting across the country.

(ii.) If the screen is too close to the attacking troops, it may serve to conceal the movement of the enemy and thus enable him to advance for a counter-attack without detection either from the air or from the ground.

(iii.) If there is a ground mist, the employment of smoke may make it impossible for the drivers of tanks to avoid obstacles, or for the infantry to keep its direction.

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